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A Continuing Bibliography with Indexes

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NASA SP-7011(205)

AEROSPACE MEDICINE AND BIOLOGY

A CONTINUING BIBLIOGRAPHY WITH INDEXES

(Supplement 205)

A selection of annotated references to unclassified reports and journal articles that were introduced into the NASA scientific and technical information system and announced in March 1980 in

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- *International Aerospace Abstracts (IAA).*

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INTRODUCTION

This Supplement to *Aerospace Medicine and Biology* (NASA SP-7011) lists 212 reports, articles and other documents announced during March 1980 in *Scientific and Technical Aerospace Reports (STAR)* or in *International Aerospace Abstracts (IAA)*. The first issue of the bibliography was published in July 1964; since that time, monthly supplements have been issued.

In its subject coverage, *Aerospace Medicine and Biology* concentrates on the biological, physiological, psychological, and environmental effects to which man is subjected during and following simulated or actual flight in the earth's atmosphere or in interplanetary space. References describing similar effects of biological organisms of lower order are also included. Such related topics as sanitary problems, pharmacology, toxicology, safety and survival, life support systems, exobiology, and personnel factors receive appropriate attention. In general, emphasis is placed on applied research, but references to fundamental studies and theoretical principles related to experimental development also qualify for inclusion.

Each entry in the bibliography consists of a bibliographic citation accompanied in most cases by an abstract. The listing of the entries is arranged in two major sections: *IAA Entries* and *STAR Entries*, in that order. The citations, and abstracts when available, are reproduced exactly as they appeared originally in *IAA* or *STAR*, including the original accession numbers from the respective announcement journals. This procedure, which saves time and money, accounts for the slight variation in citation appearances.

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An annual index will be prepared at the end of the calendar year covering all documents listed in the 1980 Supplements.

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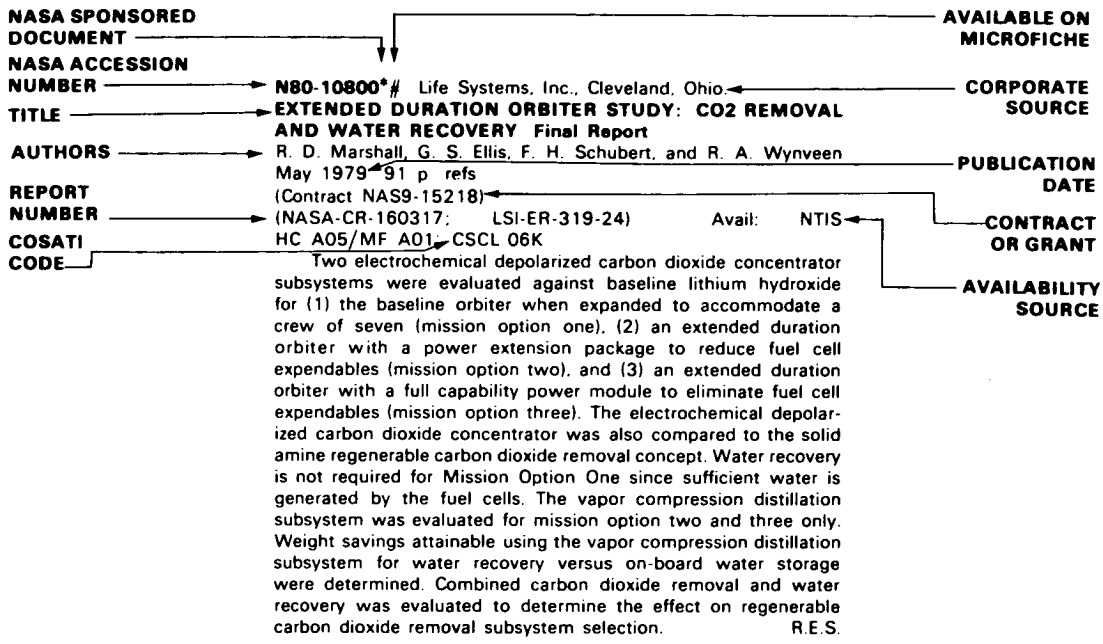

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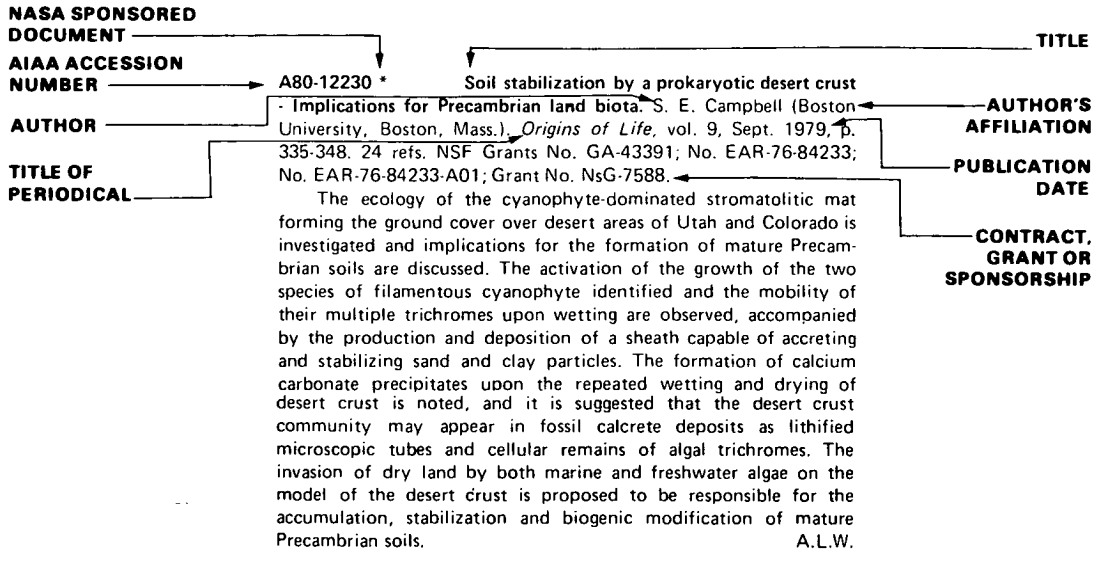

AEROSPACE MEDICINE AND BIOLOGY

A Continuing Bibliography (Suppl. 205)

APRIL 1980

IAA ENTRIES

A80-17686 * **Proton movements in response to a light-driven electrogenic pump for sodium ions in Halobacterium halobium membranes.** R. V. Greene (Cornell University, Ithaca, N.Y.) and J. K. Lanyi (NASA, Ames Research Center, Moffett Field, Calif.). *Journal of Biological Chemistry,* vol. 254, Nov. 10, 1979, p. 10986-10994. 35 refs. NSF Grant No. 76-09718; Grant No. NIH-GM-23225A.

A80-17711 **Visual cortical neurons - Are bars or gratings the optimal stimuli.** D. G. Albrecht, R. L. De Valois, and L. G. Thorell (California, University, Berkeley, Calif.). *Science,* vol. 207, Jan. 4, 1980, p. 88-90. 15 refs. NSF Grant No. BNS-74-02621; Grants No. NIH-MH-10878; No. PHS-EY-00014.

The responses of single cells in the striate cortex of the macaque monkey and the cat are examined to determine the characteristics of their visual cortical neurons. To assess whether (1) bar and edge detectors or (2) cells selective for certain spatial frequencies are more accurate in terms of the functional description, the selectivity and the responsivity-sensitivity of these neurons to bars of various widths and gratings of various spatial frequencies, were measured. All of the cells recorded from, were considerably more selective along the dimension of spatial-frequency than along the dimension of bar width. Further, most were more responsive and sensitive to the grating of optimal frequency than to the bar of optimal width.

C.F.W.

A80-17726 **Evaluation of human strain during interrupted exposure to vibration (Beurteilung der Beanspruchung des Menschen bei unterbrochener Schwingungsexposition).** W. Scheibe and W. Rohmert (Darmstadt, Technische Hochschule, Darmstadt, West Germany). *European Journal of Applied Physiology,* vol. 42, no. 4, 1979, p. 209-225. 36 refs. In German.

An investigation of the psychophysical reactions to stochastic vibrations transmitted in vertical direction to a man in a sitting position in simulated experiments under laboratory conditions is presented. Indicators of bottleneck situations in functional systems of the organism and strain measurements allow evaluation of the recreation efficiency of interruptions in exposure time. The special meaning of the distribution and the frequency rate of interruptions can be illustrated by the time variance of the strain processes of selected muscles. A significant correlation results between the degree of muscle fatigue and the period of uninterrupted exposure so that numerous interruptions of vibration exposure should be considered as a useful guideline for design in ergonomics. A.T.

A80-17727 **Quantitative study of free amino acids in human eccrine sweat excreted from the forearms of healthy trained and untrained men during exercise.** N. Liappis (Children's Hospital, Bonn, West Germany), S.-D. Kelderbacher, K. Kesseler (Bonn, Universität, Bonn, West Germany), and P. Bantzer (Gesellschaft für Mathematik und Datenverarbeitung mbH, Bonn, West Germany). *European Journal of Applied Physiology,* vol. 42, no. 4, 1979, p. 227-234. 21 refs. Research supported by the Deutsche Forschungsgemeinschaft.

A80-17728 **Body temperature and heart rate relationships during submaximal bicycle ergometer exercises.** M. Tanaka, M. A. Volle, G. R. Brisson, and M. Dion (Québec, Université, Trois-Rivières, Canada). *European Journal of Applied Physiology,* vol. 42, no. 4, 1979, p. 263-270. 21 refs.

A80-17741 * **Review of cell aging in Drosophila and mouse.** J. Miquel (NASA, Ames Research Center, Biomedical Research Div., Moffett Field, Calif.), A. C. Economos (San Jose State University, San Jose, Calif.), K. G. Bensch (Stanford University, Stanford, Calif.), H. Atlan (Paris VI, Université, Paris, France), and J. E. Johnson, Jr. (National Institutes of Health, National Institute on Aging, Baltimore, Md.). *Age,* vol. 2, July 1979, p. 78-88. 70 refs.

A80-17986 # **Study of fungal phenotypes after exposure to space flight parameters (Izuchenie fenotipov gribov posle kosmicheskogo poleta).** P. A. Volz. *Kosmicheskie Issledovaniia,* vol. 17, Nov.-Dec. 1979, p. 920-926. 21 refs. In Russian.

A80-18081 # **Physiological regulation of oxygen transport to muscles /from results of mathematical analysis of experimental data/ (O fiziologicheskoi reguliatsii transporta kisloroda v myshtsakh /po rezul'tatam matematicheskogo analiza eksperimental'nykh dannykh/).** E. G. Liabakh (Akademia Nauk SSSR, Institut Fiziologii, Leningrad, USSR) and K. P. Ivanov (Akademiia Nauk Ukrainskoi SSR, Institut Kibernetiki, Kiev, Ukrainian SSR). *Akademiia Nauk SSSR, Doklady,* vol. 248, no. 2, 1979, p. 488-491. 7 refs. In Russian.

Progress in mathematics and computer technology has markedly increased the possibility of analyzing oxygen-diffusion processes in muscles. The paper outlines a mathematical analysis pertaining to the regulation of oxygen supply to the muscles of warm-blooded animals, based on in vivo measurements of basic morphological parameters of micro-circulation. Attention is given to calculating the oxygen saturation of a muscle at rest and during muscular work under conditions of combined work and increased number of operating capillaries or under conditions of accelerated capillary blood flow. The calculations are performed using a three-dimensional model of oxygen diffusion in muscles. S.D.

A80-18082 # **Temperature compensation of the metabolism of serotonin in the brain of hibernating mammals (Temperaturnaia kompensatsiia metabolizma serotonina v mozge zimospiashchikh).** N. K. Popova, N. N. Voitenko, and A. D. Slonim (Akademiia Nauk SSSR, Institut Tsitologii i Genetiki, Novosibirsk, USSR). *Akademiia Nauk SSSR, Doklady,* vol. 248, no. 2, 1979, p. 492-494. 11 refs. In Russian.

Results are presented for a study of the temperature dependence of oxidative deamination of serotonin in the brain of red-cheeked marmots at the initial stage of hibernation, during hibernation, and after awakening. The experiments were conducted on males of the Citellus erythrogenys Brandt strain. It is likely that in hibernating mammals with decreased body temperature, the mechanisms respon-

sible for the temperature compensation of metabolism are to a certain extent similar to those for poikilothermic animals. S.D.

A80-18250 # **A new engineering approach to motion cueing technology.** H. Jaslow (Gould, Inc., Melville, N.Y.). *American Institute of Aeronautics and Astronautics, Aerospace Sciences Meeting, 18th, Pasadena, Calif., Jan. 14-16, 1980, Paper 80-0047.* 8 p. 10 refs.

A new and unique approach to motion simulation is presented which provides a simple, yet powerful, engineering tool. From a study of the physical mechanisms of sensory receptors, perceived sensation of motion can be quantified. With this quantification, a method is presented to evaluate and specify requirements for motion platforms. Calculations are made of real cue regimes vs. aircraft maneuvers and simulator excursion limits. (Author)

A80-18643 # **Static acoustic impedance profiles in auditory diagnosis.** P. W. Whaley (USAF, Institute of Technology, Wright-Patterson AFB, Ohio) and L. D. Zirkle (Oklahoma State University, Stillwater, Okla.). *American Society of Mechanical Engineers, Winter Annual Meeting, New York, N.Y., Dec. 2-7, 1979, Paper 79-WA/Bio-1.* 13 p. 6 refs. Members, $1.50; nonmembers, $3.00. NIH-supported research.

A study was carried out to determine the value in auditory diagnosis of static acoustic impedance (absence of middle ear muscle activity) plotted versus frequency. This is different from conventional impedance audiometry in that the inductance can be measured. An entirely new device (patents currently being pursued) was used to gather these data, not possible to obtain with conventional devices. Clinical data was obtained on both normal and pathological human subjects. The resulting data indicate that pathological conditions result in changes in the shape of the impedance profile which are characteristic of the particular disorder and well outside the range associated with normal ears. The authors feel that considerably more information can be detected from such an impedance profile based on their experience with frequency response properties of dynamic systems. More extensive data will be required to provide a definitive analysis of the value of this technique in diagnosis. (Author)

A80-18839 **The effect of character size on the legibility of numeric displays during vertical whole-body vibration.** C. H. Lewis and M. J. Griffin (Southampton, University, Southampton, England). *Journal of Sound and Vibration,* vol. 67, Dec. 22, 1979, p. 562-565. 5 refs. Research supported by the Ministry of Defence (Procurement Executive).

A80-18975 **Left ventricular relaxation and filling pattern in different forms of left ventricular hypertrophy - An echocardiographic study.** P. Hanrath, D. G. Mathey, R. Siegert, and W. Bleifeld (University Hospital, Hamburg, West Germany). *American Journal of Cardiology,* vol. 45, Jan. 1980, p. 15-23. 23 refs. Research supported by the Gesellschaft für Strahlen- und Umweltforschung mbH.

A80-19023 **Proficiency maintenance and assessment in an instrument flight simulator.** D. O. Weitzman, M. L. Fineberg, P. A. Gade (U.S. Army, Research Institute, Alexandria, Va.), and G. L. Compton (U.S. Army, Fort Campbell, Ky.). *Human Factors,* vol. 21, Dec. 1979, p. 701-710. 10 refs. Army-supported research.

Transfer effects have been studied to evaluate the suitability of a high fidelity flight simulator (Device 2B24) for maintaining and assessing instrument proficiency among experienced Army helicopter pilots. Evidence in support of positive transfer was obtained by comparing pilots trained in the simulator with pilots trained in the aircraft (UH-1H) and with pilots trained in both. In addition, performance evaluation in the simulator accurately predicted performance in the aircraft. This study suggests that simulators of proven effectiveness can be used both to maintain and assess the proficiency of experienced pilots. (Author)

A80-19024 * **When day is done and shadows fall, we miss the airport most of all.** S. N. Roscoe (New Mexico State University, Las Cruces, N. Mex.). *Human Factors,* vol. 21, Dec. 1979, p. 721-731. 20 refs. NASA-Army-supported research.

Both the effectiveness of pilot training and the safety of flight can be influenced by the distribution of texture in the visual scene, the distance to which the eyes accommodate, and the associated shifts in the apparent size and distance of objects in central and peripheral vision. Studies reviewed and original results presented indicate that these factors are involved in various misjudgments and illusions experienced by pilots: (1) when searching for other airborne traffic or targets, (2) when making approaches to airports over water at night, (3) when breaking out of low clouds on a final approach to a landing by reference to head-up or head-down displays, and (4) when practicing simulated approaches and landings or air-to-surface weapon deliveries by reference to synthetically generated visual systems. (Author)

A80-19025 * **Mathematical concepts for modeling human behavior in complex man-machine systems.** G. Johannsen (Forschungsinstitut für Anthropotechnik, Werthhoven, West Germany) and W. B. Rouse (Illinois, University, Urbana, Ill.). *Human Factors,* vol. 21, Dec. 1979, p. 733-747. 73 refs. Grant No. NsG-2119.

Many human behavior (e.g., manual control) models have been found to be inadequate for describing processes in certain real complex man-machine systems. An attempt is made to find a way to overcome this problem by examining the range of applicability of existing mathematical models with respect to the hierarchy of human activities in real complex tasks. Automobile driving is chosen as a baseline scenario, and a hierarchy of human activities is derived by analyzing this task in general terms. A structural description leads to a block diagram and a time-sharing computer analogy. B.J.

A80-19100 # **Scientific biomedical studies during the flight of the first Bulgarian cosmonaut (Nauchnite mediko-biologichni izsledvaniia pri poleta s uchastieto na p'rviia b'lgarski kosmonaut).** K. Zlatarev. *B'lgarska Akademiia na Naukite, Spisanie,* no. 5, 1979, p. 28-32. In Bulgarian.

A80-19452 **A nonparametric model of detection of signals, observed by a human operator on a CRT screen in the presence of noise.** V. N. Budko, F. M. Klement'ev, and N. M. Novikova. *(Radiotekhnika i Elektronika,* vol. 23, Nov. 1978, p. 2439-2442.) *Radio Engineering and Electronic Physics,* vol. 23, Nov. 1978, p. 131-133. Translation.

A method is devised for taking into account the psychological factor during the operator observation of signals on a TV screen on a noise background. The method is based on the determination of the so-called 'working characteristic' which is defined as the dependence of the probability of signal detection on the intensity of the signal as the latter is observed on a noise background. The use of nonparametric criteria for such detection processes is discussed; a special feature of such detection is the fact that false-alarm probability is independent of the form of the noise distribution function. B.J.

A80-19850 * **Confidence regions of planar cardiac vectors.** S. Dubin, A. Herr, and P. Hunt (Drexel University, Philadelphia, Pa.). *Journal of Electrocardiology,* vol. 13, Jan. 1980, p. 7-10. 8 refs. Grant No. NsG-7494.

A method for plotting the confidence regions of vectorial data obtained in electrocardiology is presented. The 90%, 95% and 99% confidence regions of cardiac vectors represented in a plane are obtained in the form of an ellipse centered at coordinates corresponding to the means of a sample selected at random from a bivariate normal distribution. An example of such a plot for the frontal plane QRS mean electrical axis for 80 horses is also presented. A.L.W.

A80-20018 * **Space motion sickness.** J. L. Homick (NASA, Johnson Space Center, Medical Sciences Div., Houston, Tex.). *Acta Astronautica,* vol. 6, Oct. 1979, p. 1259-1272. 18 refs.

Research on the etiology, prediction, treatment and prevention of space motion sickness, designed to minimize the impact of this syndrome which was experienced frequently and with severity by individuals on the Skylab missions, on Space Shuttle crews is reviewed. Theories of the cause of space motion sickness currently under investigation by NASA include sensory conflict, which argues that motion sickness symptoms result from a mismatch between the total pattern of information from the spatial senses and that stored from previous experiences, and fluid shift, based upon the redistribution of bodily fluids that occurs upon continued exposure to weightlessness. Attempts are underway to correlate space motion sickness susceptibility to different provocative environments, vestibular and nonvestibular responses, and the rate of acquisition and length of retention of sensory adaptation. Space motion sickness countermeasures under investigation include various drug combinations, of which the equal combination of promethazine and ephedrine has been found to be as effective as the scopolomine and dexedrine combination, and vestibular adaptation and biofeedback training and autogenic therapy. A.L.W.

A80-20019 * Exercise response to simulated weightlessness. C. F. Sawin, J. A. Rummel, and M. C. Buderer (NASA, Johnson Space Center, Houston, Tex.). *Acta Astronautica,* vol. 6, Oct. 1979, p. 1273-1287. 14 refs.

Two bed rest analog studies of space flight were performed; one 14 d and the other 28 d in duration. Exercise response was studied in detail during the 28 d study and following both the 14 d and 28 d studies. This paper relates the results of these studies to physiologic changes noted during and following space flight. The most consistent change noted after both bed rest and space flight is an elevated heart rate during exercise. A second consistent finding is a postflight or postbed rest reduction in cardiac stroke volume. Cardiac output changes were variable. The inability to simulate inflight activity levels and personal exercise makes a direct comparison between bed rest and the results from specific space flights difficult. (Author)

A80-20020 * A mathematical and experimental simulation of the hematological response to weightlessness. S. L. Kimzey (NASA, Johnson Space Center, Houston, Tex.), J. I. Leonard (General Electric Co., Houston, Tex.), and P. C. Johnson (Baylor University, Houston, Tex.). *Acta Astronautica,* vol. 6, Oct. 1979, p. 1289-1303. 32 refs.

A mathematical model of erythropoiesis control was used to simulate the effects of bedrest and zero-g on the circulating red cell mass. The model incorporates the best current understanding of the dynamics of red cell production and destruction and the associated feedback regulation. Specifically studied were the hemodynamic responses of a 28-day bedrest study devised to simulate Skylab experience. The results support the hypothesis that red cell loss during supine bedrest is a normal physiological feedback process in response to hemoconcentration enhanced tissue oxygenation and suppression of red cell production. Model simulation suggested the possibilities that this period was marked by some combination of increased oxygen-hemoglobin affinity, small reduction in mean red cell life span, ineffective erythropoiesis, or abnormal reticulocytosis. V.P.

A80-20021 * A study of metabolic balance in crewmembers of Skylab IV. P. C. Rambaut, C. S. Leach, and G. D. Whedon (NASA, Johnson Space Center, Medical Sciences Div., Houston, Tex.). *Acta Astronautica,* vol. 6, Oct. 1979, p. 1313-1322. 21 refs.

A metabolic balance study was conducted on the three crewmembers of the 84-day Skylab IV earth orbital mission. Dietary intake was controlled, monitored, and kept very nearly constant for a period commencing 21 days prior to flight, throughout flight, and for a period of 18 days postflight. Within the first 30 days of flight urine calcium rose to a level approx. 100% above preflight levels and remained elevated for the remainder of the flight. Fecal calcium excretion increased more slowly but continued to accelerate throughout the flight and did not return to baseline levels during the postflight period. Urinary nitrogen increased to 25-30% above preflight levels within one month following launch and thereafter gradually subsided toward control values. The overall losses of calcium averaged approx. 200 mg per day throughout the mission while nitrogen losses averaged 590 mg. Various other indices of musculoskeletal deterioration are discussed and correlated. The parallelism between the effects of weightlessness and bed rest is reviewed. It is noted, that no evidence is yet available as to the identity of the initial biological response to the absence of gravity. (Author)

A80-20022 * Amino aciduria in weightlessness. C. S. Leach, P. C. Rambaut (NASA, Johnson Space Center, Houston, Tex.), and N. di Ferrante (Baylor University, Houston, Tex.). *Acta Astronautica,* vol. 6, Oct. 1979, p. 1323-1333. 30 refs.

Urinary excretion of amino acids by the 9 Skylab crewmen was studied as an indicator of the metabolic effects caused by exposure to the space flight environment. Intake was consistent in quality and quantity throughout the 28, 59 and 84-day flights for each of the crewmen and complete collections were accomplished. The results indicated an increased excretion in most amino acids during the first month of flight which remained elevated in the second and third months but to a lesser extent. Additional indications of change in muscle and skeletal metabolism were observed. These results point to the desirability of obtaining additional indices of alterations in protein synthetic processes in conjunction with future space flights. (Author)

A80-20023 * Fluid volumes changes induced by spaceflight. P. C. Johnson (Baylor University, Houston, Tex.). *Acta Astronautica,* vol. 6, Oct. 1979, p. 1335-1341. 10 refs. Contracts No. NAS9-14578; No. NAS9-14662; No. NAS9-11201.

The blood volume (BV), plasma volume (PV), and extracellular fluid volume changes produced in crewmembers during spaceflights of 11-84 days were compared to changes after 14 or 28 days of bedrest. Spaceflight and bedrest produce approximately equal BV changes but the recorded PV change after spaceflight was less. However, the diurnal change in PV may explain the smaller decreases recorded after spaceflight. The cardiovascular deconditioning caused by spaceflight and bedrest was compared using the mean heart rate response to lower body negative pressure (LBNP) testing at -50 mmHg pressure. These tests show approximately equal LBNP produced heart rate changes after bedrest and spaceflight. A countermeasure which includes 4 hr of LBNP treatment at -30 mmHg and the ingestion of one l. of saline was studied and found capable of returning the heart rate response and the PV of bedrested subjects to control (prebedrest) levels suggesting that it would be useful to the crewmembers after a spaceflight. (Author)

A80-20082 # The effect of antiorthostatic stimuli on human operators studied using rheography data (Vliianie antiortostaticheskogo vozdeistviia na cheloveka-operatora /po dannym reografii/). Sh. T. Avetikian and A. M. Zingerman (Akademiia Meditsinskikh Nauk SSSR, Leningrad, USSR). *Fiziologiia Cheloveka,* vol. 5, Nov.-Dec. 1979, p. 1052-1059. 17 refs. In Russian.

The blood flow characteristics of the heat and shin as well as of the arterial pressure and pulse rate of human operators were studied in order to evaluate the effect of antiorthostatic stimuli. It is shown that an antiorthostatic stimulus of -45 deg for 20 min, causing increased blood flow to the upper part of the body, increases the tonus of the brain arteries and decreases the tonus of leg arteries; these changes facilitate the redistribution of blood toward the extremeities. When there is a sufficient venous flow from the brain, compensatory responses of the cardiovascular system to the antiorthostatic stimuli are not pronounced; a reduced venous outflow is accompanied by an increase in brain-artery tonus and in arterial pressure. Operator performance is found to suffer most during a pronounced reduction of venous flow from the brain. B.J.

A80-20211 # Relationship among the 55 Hz bioelectric rhythm of the olfactory bulb, the bulb S-rhythm, and respiration (Vzaimootnoshenie bioelektricheskogo ritma 55 Gts oboniatel'noi lukovitsy, lukovichnogo S-ritma i dykhaniia). G. L. Vepkhvadze and D. M. Gedevanishvili (Tbilisskii Gosudarstvennyi Meditsinskii Insti-

tut, Tiflis, Georgian SSR). *Akademiia Nauk Gruzinskoi SSR, Soobshcheniia,* vol. 95, Sept. 1979, p. 685-688. 6 refs. In Russian.

A80-20212 # **Practical criteria for analyzing the heart hemodynamics of young athletes (Prakticheskie kriterii v analize kardio-gemodinamiki u iunykh sportsmenov).** V. S. Shaginian, T. K. Zhorzholadze, V. P. Kovtun, and T. K. Kutateladze. *Akademiia Nauk Gruzinskoi SSR, Soobshcheniia,* vol. 95, Sept. 1979, p. 725-727. In Russian.

A80-20213 # **Polycardiographic research with a single-channel electrocardiograph (Polikardiograficheskoe issledovanie odnokanal'nym elektrokardiografom).** A. M. Romanko (Tbilisskii Gosudarstvennyi Meditsinskii Institut, Tiflis, Georgian SSR). *Akademiia Nauk Gruzinskoi SSR, Soobshcheniia,* vol. 95, Sept. 1979, p. 733-736. 15 refs. In Russian.

A single-channel electrocardiographic technique is described. Recorded data yield a single complex monographic curve, on which three basic parameters of heart activity are distinguished; these parameters are suitable for the phase analysis and qualitative evaluation of cardiac action. A block diagram of the setup is presented. B.J.

A80-20387 Energy uptake in the first step of visual excitation. A. Cooper (Glasgow, University, Glasgow, Scotland). *Nature,* vol. 282, Nov. 29, 1979, p. 531-533. 19 refs. Research supported by the Science Research Council.

The direct measurement of photon energy uptake during the formation of bathorhodopsin from bovine rhodopsin in the photochemical process of visual excitation is reported and the possible significance of the results is discussed. Photocalorimeter determinations of the energy uptake by rhodopsin illuminated at 450 or 485 nm and 77 K accompanied by the photoreversible formation of bathorhodopsin indicate that the ground state energy of bathorhodopsin is about 35 kcal (145 J, 1.50 eV) higher than that of rhodopsin. On the basis of this unexpectedly high ground-state energy for bathorhodopsin, ground- and excited-state potential energy surfaces for the photoreaction are constructed which reveal the possibility of the overlap of the potential surfaces. A possible mechanism for the response of rhodopsin to photon absorption is then proposed and it is noted that, because of energy surface overlap, at very low temperatures an energy barrier and a temperature dependence in the rate of bathorhodopsin formation from the excited state of rhodopsin may be found. A.L.W.

A80-20441 Combined effects of broadband noise and complex waveform vibration on cognitive performance. C. S. Harris and R. W. Shoenberger (USAF, Aerospace Medical Research Laboratory, Wright-Patterson AFB, Ohio). *Aviation, Space, and Environmental Medicine,* vol. 51, Jan. 1980, p. 1-5. 18 refs. Contract No. F33615-76-C-0401.

The performance of 12 subjects was measured on a complex counting task during exposure to each of four experimental conditions for a duration of 30 min. Two levels of noise, 65 dBA and 100 dBA, were presented both with and without 0.36 rms Gz sum-of-sines vibration. Combined 100 dBA noise and vibration produced less adverse effects than the vibration combined with 65 dBA noise. This result agrees with previous studies using tracking tasks. However, two effects were demonstrated that had not been obtained previously. First, a clearcut adverse effect of vibration on the counting task was obtained. Second, an adverse effect of 100 dBA noise on the counting tasks was demonstrated. Previously, a 110 dBA noise was required to adversely affect tracking performance. (Author)

A80-20442 Serum cholesterol levels in selected Air Force cadets compared with levels in the West Point study. D. A. Clark, E. L. Mosser, E. L. Foulds, E. L. Arnold, and F. H. Wilson, Jr. (USAF, School of Aerospace Medicine, Brooks AFB; U.S. Army Health Sciences Academy, Fort Sam Houston, Tex.). *Aviation, Space, and Environmental Medicine,* vol. 51, Jan. 1980, p. 6-10. 19 refs.

A80-20443 Eustachian tube function in selection of airmen. P. Groth, A. Ivarsson, A. Nettmark, and O. Tjernstrom (Malmo General Hospital, Malmo, Sweden). *Aviation, Space, and Environmental Medicine,* vol. 51, Jan. 1980, p. 11-17. 21 refs. Research supported by the Forsvarets Forskningsanstalt.

A comprehensive study of Eustachian tube function in 84 aspirants accepted for flight training was made. Using a pressure chamber, both static and dynamic pressure changes, as in ascent and descent, were applied to test the tubal pressure equilibrating capacity in the sitting position. While all 84 were otologically healthy, a wide range in the pressure equilibrating capacity was found - 20% could not equilibrate static over- and underpressures of 10 cm H2O completely, 8% could not equilibrate at all during simulated descent, 3 subjects reported acute vertigo during simulated ascent in combination with high unilateral middle ear pressure. Asymmetry between ears of single subjects in pressure equilibrating capacity was also found to a large extent. It was not possible to identify subjects with poor equilibrating capacity by simple tests like Valsalva's or Toynbee's manoeuvres. The results may indicate that today's criteria for Eustachian tube function in the selection of airmen can be made more efficient. (Author)

A80-20444 * **A sudden-stop vestibulovisual test for rapid assessment of motion sickness manifestations.** A. Graybiel (U.S. Navy, Naval Aerospace Medical Research Laboratory, Pensacola, Fla.) and J. R. Lackner (Brandeis University, Waltham; MIT, Cambridge, Mass.). *Aviation, Space, and Environmental Medicine,* vol. 51, Jan. 1980, p. 21-23. 5 refs. Contract No. NAS9-15147. NASA Order T-9140-E.

A sudden-stop vestibulovisual (SSV) test employing a rotating chair centered in a striped cylindrical enclosure is discussed. A subject, with his eyes covered, is accelerated clockwise at 15 degrees per second squared and maintained at this velocity for 30 sec. The chair is then brought to rest within 1.5 sec and remains at rest for 30 sec while physiological parameters and motion sickness symptoms are recorded. The procedure is repeated until a predetermined motion sickness endpoint (slight nausea) is reached or 20 stops have been made. The scores made by 14 subjects in 4 sessions in terms of susceptibility to motion sickness are presented, and the pattern of all scores indicates rates of acquisition and decay of adaptation effects. It is concluded that at sea or in flight training good retention of adaptation is more important than is a rapid rate of acquiring adaptation, but in Spacelab, where early missions will be brief, rapid acquisition is all-important. L.M.

A80-20445 Effect of 1 alpha-hydroxy-cholecalciferol and varying phosphorous content in the diet on calcium phosphorous metabolism in hypokinetic rats. A. S. Ushakov, V. B. Spirichev, M. S. Belakovskii, N. V. Blazheevich, and A. L. Pozdniakov (Ministerstvo Zdravookhraneniia SSSR, Institut Mediko-Biologicheskikh Problem, Moscow, USSR). *Aviation, Space, and Environmental Medicine,* vol. 51, Jan. 1980, p. 24-28. 12 refs.

A80-20446 Effect of hypogravity on human lymphocyte activation. A. Cogoli, M. Valluchi-Morf, M. Mueller (Zürich, Eidgenössische Technische Hochschule, Zurich, Switzerland), and W. Briegleb (Deutsche Forschungs- und Versuchsanstalt für Luft- und Raumfahrt, Institut für Flugmedizin, Bonn, West Germany). *Aviation, Space, and Environmental Medicine,* vol. 51, Jan. 1980, p. 29-34. 22 refs. Swiss National Science Foundation Grant No. 3,109,077.

Cultures of human lymphocytes were exposed to the mitogen concanavalin A in a low-g environment generated by a fast rotating clinostat. DNA-synthesis was determined by the incorporation of (H-3)-thymidine as the parameter for activation, cell ultrastructure was analyzed by electron microscopy, and cell movements were recorded by a cinecamera. The results were compared with 1-g controls. The cells cultured at low g show: (1) a depression of activation by 50%, (2) the appearance of 'mitochondria-rich' cells, and (3) the enhanced formation of pseudovilli and uropods. Investigations in vitro at low and high g and reports on the effect of

spaceflights on lymphocytes from cosmonauts and astronauts suggest that hypogravity depresses, whereas hypergravity enhances, lymphocyte activation by mitogens. (Author)

A80-20447 * Hypergravity and estrogen effects on avian anterior pituitary growth hormone and prolactin levels. R. P. Fiorindo and J. A. Negulesco (Ohio State University, Columbus, Ohio). *Aviation, Space, and Environmental Medicine,* vol. 51, Jan. 1980, p. 35-40. 26 refs. Research supported by the Ohio State University; Contract No. NAS2-6634.

Developing female chicks with fractured right radii were maintained for 14 d at either earth gravity (1 g) or a hypergravity state (2 g). The birds at 1 g were divided into groups which received daily injections of (1) saline, (2) 200 micrograms estrone, and (3) 400 micrograms estrone for 14 d. The 2-g birds were divided into three similarly treated groups. All 2-g birds showed significantly lower body weights than did 1-g birds. Anterior pituitary (AP) glands were excised and analyzed for growth hormone and prolactin content by analytical electrophoresis. The 1-g chicks receiving either dose of daily estrogen showed increased AP growth hormone levels, whereas hypergravity alone did not affect growth hormone content. Chicks exposed to daily estrogen and hypergravity displayed reduced growth hormone levels. AP prolactin levels were slightly increased by the lower daily estrogen dose in 1-g birds, but markedly reduced in birds exposed only to hypergravity. Doubly-treated chicks displayed normal prolactin levels. Reduced growth in 2-g birds might be due, in part, to reduced AP levels of prolactin and/or growth hormone. (Author)

A80-20448 Development of 'sports anemia' in physically fit men after daily sustained submaximal exercise. M. W. Radomski, B. H. Sabiston (Defence and Civil Institute of Environmental Medicine, Downsview, Ontario, Canada), and P. Isoard (Service de Santé des Armées, Centre de Recherches, Lyons, France). *(Aerospace Medical Association, Annual Meeting, 50th, Washington, D.C., May 14-17, 1979.) Aviation, Space, and Environmental Medicine,* vol. 51, Jan. 1980, p. 41-45. 25 refs.

Hematological changes were studied in physically fit young soldiers who marched 35 km/d for 6 d, working at 35 percent of their maximal oxygen consumption. Four days of marching produced decreases in numbers of erythrocytes (RBC) and in hematocrit (Hct). This 'sports anemia' persisted beyond day 6 into the post-march period and was accompanied by decreases in hemoglobin (Hb), mean corpuscular hemoglobin (MCH), mean corpuscular hemoglobin concentration (MCHC), and mean corpuscular volume (MCV). The latter decrease was attributed to a preferential destruction of large RBC. The post-march period was characterized by an early (2 d) recovery of RBC numbers, Hct, and MCV, and a persistent (greater than 4 d) decrease in Hb, MCH, and MCHC. This pattern, characteristic of hypochromic macrocystosis, possibly reflects a premature release of young RBC from the bone marrow. Clearly, 'sports anemia,' previously reported to occur with intensive physical exercise, can also result from sustained and repetitive submaximal exercise. (Author)

A80-20449 Psychophysiological monitoring of operator's emotional stress in aviation and astronautics. P. V. Simonov, M. V. Frolov, and E. A. Ivanov (Academy of Sciences, Institute of Higher Nervous Activity and Neurophysiology, Moscow, USSR). *Aviation, Space, and Environmental Medicine,* vol. 51, Jan. 1980, p. 46-49. 6 refs.

Skill performance of an aerospace operator is greatly influenced by the level of emotional stress. The paper reviews methods of objective monitoring of emotional stress based on analysis of changes in the characteristics of physiological functions. Indirect methods like analysis of physiological and electrophysiological signals from the body surface, including the pneumogram, ECG, EEG, GSR and various speech parameters are preferred. To eliminate the shortcomings of physiological monitoring and performance testing a combined method is recommended permitting one to diminish the size of the required electrophysiological signal and to shorten the frequency of testing. Special attention is given to estimation of the changes in heart rate and T-peak amplitude and spectral and intonational characteristics of the human voice. The experiment conducted on a mock-up of an aircraft at the Vnukovo airport is described. L.M.

A80-20450 Bone remodeling in centrifuged rats - Histomorphometric study after an 18-day run. C. Nogues and M. Peuchmaur (Laboratoire Central de Biologie Aéronautique, Paris, France). *Aviation, Space, and Environmental Medicine,* vol. 51, Jan. 1980, p. 50-55. 17 refs.

A histomorphometric and histodynamic study of bone tissue was conducted in rats exposed to 2 G centrifugation for a period of 18 d. Shortening of the femurs was observed, associated with alterations of the growth cartilage in centrifuged animals. The morphometric analysis demonstrates a reduction in bone volume without increase in the activity of osteoblasts. The fluorescent fixation during the dynamic study shows a reduced appositional rate. This result seems to reflect the numerous factors which contribute to the experimental centrifugation test: the osteoporosis is cortisone induced; it is a response to the aggression and probably conceals the remodeling due to higher stress loads. (Author)

A80-20451 Heat stress exposure of aerial spray pilots. B. Gribetz, E. D. Richter, M. Krasna, and M. Gordon (Jerusalem, Hebrew University; Ministry of Transport, Jerusalem, Israel). *Aviation, Space, and Environmental Medicine,* vol. 51, Jan. 1980, p. 56-60. 13 refs.

A80-20452 Motion sickness. I - A theory. II - A clinical study based on surgery of cerebral hemisphere lesions. III - A clinical study based on surgery of posterior fossa tumors. R. C. Schneider and E. C. Crosby (University Hospital, Ann Arbor, Mich.). *Aviation, Space, and Environmental Medicine,* vol. 51, Jan. 1980, p. 61-85. 99 refs.

A theory is suggested on 'motion sickness' reported by 15 percent of American astronauts and 17 percent of Russian cosmonauts and described as 'dizziness, nausea, vomiting, flashes of light, formed hallucinations or illusions of inversion of image in space or disorientation in space'. Two types of motion sickness are defined. Both have manifestations of nausea, vomiting, headache and dizziness, but there are symptoms of the motion sickness as related to peripheral organs, the inner ear and the eye, as contrasted to 'motion sickness in space' which has additional symptoms of hallucinations and illusions and is related to the temporoparieto-occipital cortex of the brain. Vascular insufficiency to this area by spasm of the vessel may be responsible for this symptomatology. The theory is supported by clinical studies based on brain surgery. The study suggests that it might be profitable to test a space applicant not only in a centrifugal or horizontal plane but also in vertical or other planes with the sudden application of restraint at different rates of speed using CT scanning. V.L.

A80-20500 # Perspectives of the utilization of hyperbaric oxygenation in aviation medicine (Perspektivy ispol'zovaniia giperbaricheskoi oksigenatsii v praktike aviatsionnai meditsiny). I. N. Cherniakov, V. I. Prodin, and P. Ia. Azhevskii. *Voenno-Meditsinskii Zhurnal,* Nov. 1979, p. 52-54. In Russian.

A80-20680 # A mathematical model of the disruption of mirror symmetry in prebiological evolution (Matematicheskaia model' narusheniia zerkal'noi simmetrii v predbiologicheskoi evoliutsii). L. L. Morozov and V. E. Kulesh (Vsesoiuznyi Nauchno-Issledovatel'skii i Proektno-Konstruktorskii Institut po Truboprovodnym Konteinernym Sistemam, Moscow, USSR). *Akademiia Nauk SSSR, Doklady,* vol. 248, no. 5, 1979, p. 1263-1266. In Russian.

The paper develops a computer model that relates the evolution of optical asymmetry in phase-specialized multimolecular systems to

the prebiological evolution of such systems. It is shown that the formation and evolution of open phase-specialized systems under conditions of interaction with the environment and stochasticity of reproduction processes created conditions for the disruption of mirror symmetry and the 'perfection' of optical asymmetry. The proposed model agrees well with Oparin's theories of abiogenesis.
B.J.

A80-20681 # Topographic characteristics of post-synaptic actions of primary vestibular fibers on the vestibulospinal neurons of Deiters nucleus (Topograficheskie osobennosti postsinapticheskikh vliianii pervichnykh vestibuliarnykh volokon na vestibulo-spinal'nye neirony iadra Deitersa). V. A. Sarkisian and V. V. Fanardzhian (Akademiia Nauk Armianskoi SSR, Institut Fiziologii, Yerevan, Armenian SSR). *Fiziologicheskii Zhurnal SSSR*, vol. 65, Oct. 1979, p. 1441-1447. 17 refs. In Russian.

A80-20682 # Deiters-nucleus potentials evoked by stimulation of the neural elements of bones and musculo-cutaneous nerves in animals with the cerebrum and cerebellum removed (Vyzvannye potentsialy iadra Deitersa pri stimuliatsii nervnykh elementov kostei, kozhnykh i myshechnykh nervov u detserebrirovannykh i tserebellektomirovannykh zhivotnykh). V. P. Orlov (Ministerstvo Zdravookhraneniia Latviiskoi SSR, Nauchno-Issledovatel'skii Institut Eksperimental'noi i Klinicheskoi Meditsiny, Riga, Latvian SSR). *Fiziologicheskii Zhurnal SSSR*, vol. 65, Oct. 1979, p. 1487-1491. 18 refs. In Russian.

Cats were used to record evoked potentials in the stimulation of the neural elements of the bone marrow in front- and hind-leg bones and musculo-cutaneous nerves in the Deiters nucleus. The data indicate that information from the neural elements of the bones can reach the Deiters nucleus via spinovestibular channels bypassing the cerebellum. V.P.

A80-20683 # Effect of hypoxia on the contractile activity of smooth muscle cells in the thoracic duct (Vliianie gipoksii iva sokratitel'nuiu aktivnost' gladkomyshechnykh kletok grudnogo limfaticheskogo protoka). N. A. Gladysheva (Leningradskii Sanitarno-Gigienicheskii Meditsinskii Institut, Leningrad, USSR). *Fiziologicheskii Zhurnal SSSR*, vol. 65, Oct. 1979, p. 1520-1526. 13 refs. In Russian.

A80-20684 # Hormonal regulation of calcium and phosphorus homeostasis during physical activity (Gormonal'naia reguliatsiia gomeostaza kal'tsiia i fosfora pri fizicheskoi nagruzke). G. G. Tsybizov (Tartuskii Gosudarstvennyi Universitet, Tartu, Estonian SSR). *Fiziologicheskii Zhurnal SSSR*, vol. 65, Oct. 1979, p. 1539-1543. 13 refs. In Russian.

A80-20855 Modeling and simulation. Volume 10 - Proceedings of the Tenth Annual Pittsburgh Conference, University of Pittsburgh, Pittsburgh, Pa., April 25-27, 1979. Part 1 - Biomedical. Conference sponsored by the University of Pittsburgh. Edited by W. G. Vogt and M. H. Mickle. Pittsburgh, Pa., Instrument Society of America, 1979. 308 p. Price of five parts, $125.

The papers deal with the mathematical modeling of biomedical mechanisms and phenomena. Among the topics covered are: the mathematical modeling of intracranial pressure dynamics; computer models for freezing and thawing in biological systems; modeling for therapeutic design; pattern recognition and information processing in biological problems; modeling and estimation in biological systems; spatial vision; information modeling of biological structures; and modeling and estimation in biomedical systems. V.P.

A80-20856 The informational structure of DNA, RNA, and amino acid sequences. D. W. Kopp, G. W. Moser, and J. A. Skraly (Pittsburgh, University, Pittsburgh, Pa.). In: Modeling and simulation. Volume 10 - Proceedings of the Tenth Annual Pittsburgh Conference, Pittsburgh, Pa., April 25-27, 1979. Part 1. Pittsburgh, Pa., Instrument Society of America, 1979, p. 139-150. 25 refs.

In the study described, the differences between the informational structure variables for DNA, RNA, and polypeptides were noted, and information variables which significantly discriminated between sources were identified. Using only structure information variables in a discriminant analysis technique, 48 of the 53 mRNA sequences investigated could be properly identified as to DNA, RNA, or protein source. A new powerful approach to the investigation of the informational structure of nucleic acids and polypeptides is proposed. V.P.

A80-20857 Information processes in the evolution of protein synthesis. G. W. Moser, D. W. Kopp, and J. A. Skraly (Pittsburgh, University, Pittsburgh, Pa.). In: Modeling and simulation. Volume 10 - Proceedings of the Tenth Annual Pittsburgh Conference, Pittsburgh, Pa., April 25-27, 1979. Part 1. Pittsburgh, Pa., Instrument Society of America, 1979, p. 151-159. 16 refs.

The role of DNA base probabilities and their relationship with information structure was investigated. An interesting result is that thymine and guanine base probabilities have a principal influence on DNA sequence information. DNA information content is not related to the length of the sequence, but the informational content of RNA and amino acid sequences is. The variety of triplets in RNA sequences and the variety of kind of amino acids in a polypeptide chain were related to the sequence information or order of bases in DNA molecules. A discussion of these results in the light of current evolutionary theory provides a basis for the understanding of the control of protein synthesis. V.P.

A80-20858 Spatial filtering and mechanisms of perception. A. P. Ginsburg (USAF, Aviation Vision Laboratory, Wright-Patterson AFB, Ohio). In: Modeling and simulation. Volume 10 - Proceedings of the Tenth Annual Pittsburgh Conference, Pittsburgh, Pa., April 25-27, 1979. Part 1. Pittsburgh, Pa., Instrument Society of America, 1979, p. 185-192. 11 refs.

Attempts have been made to distinguish between visual mechanisms as being space domain feature detectors or transform domain spatial frequency detectors. It is shown that these descriptions may be considered equivalent in terms of producing similar filtered images. Fourier-like transformation, however, appears to be a more accurate description of the filtering process in the case of biological data. V.P.

A80-20859 Nonlinear interactions in binocular vision. H. R. Wilson (Chicago, University, Chicago, Ill.). In: Modeling and simulation. Volume 10 - Proceedings of the Tenth Annual Pittsburgh Conference, Pittsburgh, Pa., April 25-27, 1979. Part 1. Pittsburgh, Pa., Instrument Society of America, 1979, p. 209-213. 13 refs.

The existence of hysteresis effects in binocular vision is well documented. In addition, it has been shown that binocular hysteresis may occur even when eye movements are not a factor, thus pointing to the existence of neural hysteresis (presumably at the cortical level). The theory of differential equations provides a convenient framework for modeling this neural hysteresis. One approach to the study of nonlinear dynamic phenomena is through the application of Volterra or Wiener kernel expansions; it has been successfully applied to a number of physiological and psychophysical phenomena. However, there is an important class of nonlinear phenomena which cannot be understood within this framework-cooperative phenomena involving hysteresis. In the present paper, a simple cooperative effect in human binocular vision is described, and a physiologically plausible mathematical model for analyzing it is proposed. V.P.

A80-20860 Interpreting nonlinear systems - The third order kernel of the eye movement control system. S. Klein (California Institute of Technology, Pasadena; Claremont College, Claremont, Calif.). In: Modeling and simulation. Volume 10 - Proceedings of the Tenth Annual Pittsburgh Conference, Pittsburgh, Pa., April 25-27, 1979. Part 1. Pittsburgh, Pa., Instrument Society of America, 1979, p. 215-222. 15 refs.

White noise stimuli are useful for analyzing nonlinear systems. A technique has been developed which improves the temporal resolution of the measured response. The role of the third order Wiener kernel is examined in an application to the eye movement control system. Unusual aspects of that system are explored. (Author)

A80-20861 Theoretical problems in modeling color grating detection. R. F. Quick, Jr. (Carnegie-Mellon University, Pittsburgh, Pa.). In: Modeling and simulation. Volume 10 - Proceedings of the Tenth Annual Pittsburgh Conference, Pittsburgh, Pa., April 25-27, 1979. Part 1. Pittsburgh, Pa., Instrument Society of America, 1979, p. 249-252. 10 refs.

The spatial properties of single and double opponent neurons in vision are discussed in relation to their possible effects on chromatic contrast detection by human observers. From measured line-spread data it is argued that double-opponent mechanisms are responsible for some contrast detection results. Sinewave sensitivity curves, on the other hand, give evidence that other mechanisms, possibly single-opponent, are also active at low spatial frequencies. (Author)

A80-20899 Real-time simulation of FLIR and LLLTV Systems for aircrew training. W. L. Foley (USAF, Advanced Systems Div., Wright-Patterson AFB, Ohio). In: Modeling and simulation. Volume 10 - Proceedings of the Tenth Annual Pittsburgh Conference, Pittsburgh, Pa., April 25-27, 1979. Part 5. Pittsburgh, Pa., Instrument Society of America, 1979, p. 1737-1746.

The paper deals with simulation of Forward Looking Infrared (FLIR) and Low Light Level TV (LLLTV) Systems for application to training aircrews in performing full-scale mission simulation. Attention is given to simulating of the thermal or visual signatures typical for a total scenario consisting of the sensor, atmosphere, and ground environment that consider time of day, season of year, etc. V.T.

A80-21017 Occupational exposure to radio-frequency electromagnetic fields. K. H. Mild (Umea Hospital, Umea, Sweden). *IEEE, Proceedings,* vol. 68, Jan. 1980, p. 12-17. 23 refs.

The paper considers occupational exposure to radio-frequency (RF) electromagnetic (EM) fields in industrial processes in near-field situations where electric and magnetic field strengths are monitored to assess the health hazard. Plastic materials are joined by an RF machine whose electrodes are not shielded and which may produce high level RF fields in the immediate vicinity, exceeding the ANSI standard. A physiotherapist may be exposed to high E and H fields using RF shortwave therapy; the maintenance personnel in FM/TV broadcast towers are subject to intense RF fields, and induction heating equipment used for forging, annealing and brazing can expose operators' hands to magnetic fields. A.T.

A80-21018 Electromagnetic radiation from selected telecommunications systems. R. C. Petersen (Bell Telephone Laboratories, Inc., Murray Hill, N.J.). *IEEE, Proceedings,* vol. 68, Jan. 1980, p. 21-24.

The paper describes the instrumentation and measurement techniques used in a study of electromagnetic (EM) energy in radio transmission systems, and summarizes results obtained for high frequency (HF) radio, tropospheric scatter, earth-satellite, and microwave radio relay systems. Power density and electric field measurements were made at selected facilities, including antenna tower locations for point-to-point microwave radio equipment; it was found that the maximum electric field strengths associated with HF radio systems in areas accessible to radio personnel was less than 36 V/m. The maximum power densities associated with tropospheric scatter systems, satellite communication earth stations and point-to-point microwave radio systems were less than 1 microwatt/sq cm; in some cases microwave radio rooms in high building floors showed maximum levels due to VHF and UHF transmitters of a few tens of microwatt/sq cm. A.T.

A80-21019 State of the knowledge for electromagnetic absorbed dose in man and animals. O. P. Gandhi (Utah, University, Salt Lake City, Utah). *IEEE, Proceedings,* vol. 68, Jan. 1980, p. 24-32. 32 refs.

The paper gives the EM absorbed dose for man and animals at various frequencies for the plane wave irradiation condition for different orientations of the body relative to incident fields. Also included are the results for the whole-body absorption for conditions of electrical contact with ground and in the presence of reflecting surfaces of high conductivity and multiple animals. The data are given for the distribution of power deposition in man models for the resonance conditions of highest whole-body electromagnetic absorption. The highlights of the results obtained with proportionately scaled saline- and biological-phantom-filled models of man have been confirmed by experiments with small laboratory animals, from 25-g mice to 2250-g rabbits. (Author)

A80-21020 Electromagnetic dosimetry for models of humans and animals - A review of theoretical and numerical techniques. C. H. Durney (Utah, University, Salt Lake City, Utah). *IEEE, Proceedings,* vol. 68, Jan. 1980, p. 33-40. 46 refs.

The paper reviews techniques of electromagnetic dosimetry for human and animal models. Numerical techniques, analytical cylindrical models, and geometrical optics methods are described, noting the useful frequency range of each method; analytical techniques included analysis of planar and spherical models, long-wavelength analysis of spheroids and ellipsoids and solutions of the wave equation in spheroidal coordinates. Numerical techniques involved the moment method and the extended boundary condition method to calculate the specific absorption rate in biological models. It is concluded that advancements were made through a combination of techniques that include analytical methods in which Maxwell's equations are solved, and numerical techniques in which large systems of simultaneous equations are solved by matrix inversion or iteration. A.T.

A80-21021 Microwave biological effects - An overview. S. M. Michaelson (Rochester, University, Rochester, N.Y.). *IEEE, Proceedings,* vol. 68, Jan. 1980, p. 40-49. 99 refs. Contract No. EY-76-C-02-3490.

The paper presents a review of microwave (MW) biological effects. Principles of biologic experiments are outlined stressing that their reliability depends on proper selection of animal models and extrapolation of data from animals to man, and on correct scaling of results from various species; the cellular-chromosome-genetic effects, the gonads, and neuroendocrine effects are considered, noting that the latter have been interpretated as the result of direct MW interactions with the central nervous system. The behavioral effects, cardiovascular reactions, and hematopoietic results have been covered, along with effects on immunity, and auditory and ocular responses. It is concluded that although there is considerable agreement on the biological effects and potential hazards of MW, there are questions as to the definition of hazard and whether all effects are harmful. A.T.

A80-21022 Microwave cataractogenesis. S. F. Cleary (Virginia Commonwealth University, Richmond, Va.). *IEEE, Proceedings,* vol. 68, Jan. 1980, p. 49-55. 52 refs.

A review of the biological effects of electromagnetic radiation and investigations of microwave cataractogenesis is presented. Studies suggest involvement of thermal damage. Time-intensity cataract thresholds for acute exposures of rabbits indicate dose reciprocity, and the induction of lens opacification following repeated exposure at intensities below the threshold for single-dose exposures suggests a cumulative component of lens damage and the existence of repair mechanisms. Cataract induction has been reported in humans exposed to microwave radiation, while acute lens opacification appears to involve thermally induced lens damage at intensities of 100 microwatt/sq cm. A.T.

A80-21023 **Microwave irradiation and the blood-brain barrier.** D. R. Justesen (U.S. Veterans Administration Medical Center; Kansas, University, Kansas City, Kan.). *IEEE, Proceedings,* vol. 68, Jan. 1980, p. 60-67. 55 refs. Research supported by the U.S. Veterans Administration; U.S. Food and Drug Administration Grant No. FD-00650.

The paper examines microwave irradiation and the blood-brain barrier. The mammalian blood-brain barrier (BBB) is believed to participate in regulating the brain fluid environment, and reports of the altered BBB function in small animals after exposure to weak microwave fields show that the tight junctions of the BBB capillaries are loosened by microwaves only at high field strengths that elevate brain temperature. Anatomical data reveal that the tight junctions remain intact, but that enhanced blood-to-brain vesicular transport of normally excluded tracer molecules occurs reversibly in small animals exposed to moderate field strength waves. It is concluded that brief exposure to microwave fields impairs the cardiovascular function, but the effect of long-term exposure is not known. A.T.

A80-21024 **The microwave auditory phenomenon.** J. C. Lin (Wayne State University, Detroit, Mich.). *IEEE, Proceedings,* vol. 68, Jan. 1980, p. 67-73. 41 refs. Navy-NSF-supported research.

The paper examines electrophysiological activity produced by exposing the brains of laboratory animals to rectangular pulses of microwave energy. These results suggest that a microwave auditory phenomenon is evoked by a mechanism similar to conventional sound reception, and that the primary interaction site is peripheral to the cochlea. It is shown that the peak pressure due to thermal expansion is greater than the radiation pressure or electrostriction, and that the induced sound frequency is only a function of the size and acoustic property of the brain. Several suggestions were made for future research in microwave auditory effect and its health implications. A.T.

A80-21025 **Advances in microwave-induced neuroendocrine effects - The concept of stress.** S.-T. Lu, S. M. Michaelson (Rochester, University, Rochester, N.Y.), and W. G. Lotz (U.S. Navy, Naval Aerospace Medical Research Laboratory, Pensacola, Fla.). *IEEE, Proceedings,* vol. 68, Jan. 1980, p. 73-77. 46 refs. Navy-supported research.

The paper examines progress in studies of microwave-induced neuroendocrine effects with respect to the current concepts of neuroendocrine control mechanisms. Recent evidence indicates that neuroendocrine effects are induced by microwave exposure with a threshold intensity required for the onset of the response, with the level of the threshold varying on the specific endocrine parameter. The response of the endocrine systems appears to be a nonspecific stress reaction in the case of adreno-cortical and growth hormone changes, but it is a metabolically specific response to increased energy input in the case of pituitary-thyroid changes. A.T.

A80-21026 # **Epidemiologic studies of microwave effects.** C. Silverman (U.S. Public Health Services; U.S. Food and Drug Administration, Rockville, Md.). *IEEE, Proceedings,* vol. 68, Jan. 1980, p. 78-84. 31 refs.

This is a selective review of human epidemiologic studies and related information concerning biologic and health effects of microwave radiation. Following a description of the objectives and methods of epidemiology, the approach to microwave effects is considered and two recent but not yet published studies are described, namely, a study of U.S. naval personnel occupationally exposed to radar, and a study of American Embassy personnel in Moscow. Investigations of several reported or suspected adverse effects are assessed: ocular effects, nervous and behavioral effects, congenital anomalies, and cancer. Suggestions are offered for further epidemiologic research. (Author)

A80-21027 # **Soviet and Eastern European research on biological effects of microwave radiation.** D. I. McRee (National Institutes of Health, National Institute of Environmental Health Sciences, Research Triangle Park, N.C.). *IEEE, Proceedings,* vol. 68, Jan. 1980, p. 84-91. 33 refs.

A review of Soviet and Eastern European research on biological effects of microwave radiation is presented. The literature reports changes in almost all biological systems at exposure power densities less than 10 mW/sq cm, and since 1976 more data has been published on long-term microwave exposures at power density levels below 10 mW/sq cm. Effects on humans, metabolic effects, central nervous system investigations, and neuroendocrine effects are discussed, along with cardiovascular, blood, immunology, reproductive, and cell and virus manifestations. It is concluded that the overview of the Soviet and Eastern European literature indicates a large number of bioeffects at exposures below 10 mW/sq cm, with a significant number of biological changes reported below 1 mW/sq cm. A.T.

A80-21028 **Study of effects of long-term low-level rf exposure on rats - A plan.** A. W. Guy, C.-K. Chou, R. B. Johnson, and L. L. Kunz (Washington, University, Seattle, Wash.). *IEEE, Proceedings,* vol. 68, Jan. 1980, p. 92-97. 18 refs. U.S. Rehabilitation Services Administration Grant No. 16-P-56818; Contract No. F33615-78-C-0631.

The study is designed to simulate the chronic exposure of man to 450-MHz radio-frequency (rf) radiation at an incident power density of 1 mW/sq cm. This paper presents a plan for conducting a lifetime exposure study involving two phases of work. The first phase, up to March 1980, is being spent in preparation for the chronic study. During the second phase, 200 rats, 100 experimental and 100 control, will be exposed 22 h/day over their lifetime to pulse-modulated 2450-MHz rf fields at an incident power density less than 500 microwatts/sq cm. The state of health of each animal will be assessed periodically throughout the exposure period until the death of the animal. Blood chemistry parameters, mortality rates, histopathology, body weight, and water and food consumption will be the biological endpoints of this study. The pulse-modulated fields consist of 16 pulse groups/sec (25 pulses/group) with a pulse duration of 10 microsec and a period of 500 microsec. (Author)

A80-21029 # **Biological effects of electric and magnetic fields associated with ELF communications systems.** J. D. Grissett (U.S. Navy, Naval Aerospace Medical Research Laboratory, Pensacola, Fla.). *IEEE, Proceedings,* vol. 68, Jan. 1980, p. 98-104. 29 refs.

The paper presents an evaluation of the biological effects of electric and magnetic fields associated with the extremely low frequency (ELF) submarine communication system. The design of the ELF system is described noting that the magnetic fields at the earth's surface above the system antenna would average 0.02 mT and the electric field gradient would be 0.07 V/m. It was found that ELF fields are not likely to present a genetic hazard, and should have no effect on fertility and cell growth. Studies of serum triglyceride levels in humans showed no effects from ELF fields, but no conclusive data could be found regarding their effect on circadian rhythms and electrosensitive fish. It was concluded that while the possibility of a physiological perturbation from ELF fields exists, there was no experimental or theoretical basis to assume a hazard at exposure levels of 0.02 mT and 0.07 V/m. A.T.

A80-21030 **RF-field interactions with biological systems - Electrical properties and biophysical mechanisms.** H. P. Schwan and K. R. Foster (Pennsylvania, University, Philadelphia, Pa.). *IEEE, Proceedings,* vol. 68, Jan. 1980, p. 104-113. 71 refs, Contract No. N00D14-79-C-0392.

Electrical properties of tissues, macromolecular solutions, and cell membranes are summarized at frequencies from the extra low frequency (ELF) to microwave range. Previously presented dielectric data are supplemented by new results and a more detailed discussion of the physical mechanisms for the observed temperature coefficients of the dielectric properties. The dielectric data are discussed in terms of the interaction mechanisms which give rise to observed relaxational effects. Possible mechanisms for nonthermal weak interactions between radio-frequency (RF) energy and tissues are discussed and evaluated. (Author)

A80-21031 **Cellular effects: Millimeter waves and Raman spectra - Report of a panel discussion.** D. L. Jaggard and J. L. Lords (Utah, University, Salt Lake City, Utah). *IEEE, Proceedings,* vol. 68, Jan. 1980, p. 114-119. 12 refs.

On June 22, 1979, a panel discussion was held at the Bio-electromagnetics Symposium in Seattle, Wa. In this report, the statements of the panel members are summarized and several common suggestions are commented on. Written abstracts which correspond to the oral presentations of most of the panel members are also included. (Author)

A80-21032 # **Frequency and power windowing in tissue interactions with weak electromagnetic fields.** W. R. Adey (U.S. Veterans Administration Hospital; Loma Linda University, Loma Linda, Calif.). *IEEE, Proceedings,* vol. 68, Jan. 1980, p. 119-125. 47 refs. Research supported by the U.S. Department of Energy; Grant No. PHS-1-R01-678-01; Contracts No. N00014-76-C-0421; No. DE-A101-79ET29078.

The paper examines the frequency and power windowing in tissue interactions with weak electromagnetic fields. Nonionizing electromagnetic (EM) fields raising temperature orders of magnitude less than 0.1 C may result in major physiological changes not attributable to raised temperature per se, and have produced chemical, physiological, and behavioral changes only within windows in frequency and incident energy. Two different intensity windows have been observed, one for ELF tissue gradients about 10 to the -7th power V/cm, and one for amplitude modulated RF and microwave gradients about 0.1 V/cm. Coupling to living cells requires amplifying mechanisms based on nonequilibrium processes; these cooperative processes are important in immune and hormonal responses, and in nerve cell excitation. Polyanionic proteinaceous material on cell membrane surfaces appear to be the site of detection of these weak molecular and neuroelectric stimuli. A.T.

A80-21033 **Steady magnetic fields in noninvasive electromagnetic flowmetry.** S. X. Salles-Cunha (Wisconsin, Medical College, Milwaukee, Wis.), J. H. Battocletti, and A. Sances, Jr. (Wisconsin, Medical College, Milwaukee; U.S. Veterans Administration Medical Center, Wood, Wis.). *IEEE, Proceedings,* vol. 68, Jan. 1980, p. 149-155. 26 refs. Research supported by the U.S. Veterans Administration Medical Center; Grant No. NIH-NO1-HI-2216.

Transcutaneous electromagnetic flowmetry measures, noninvasively, the induced voltage generated by the flow of blood through a region immersed in a magnetic field. Steady magnetic fields of less than 0.5 T have been used to measure pulsatile popliteal, brachial, and bilateral common carotid blood flow in normal subjects, in patients with arteriovascular disease, and in subjects with arteriovenous fistula surgically created for hemodialysis. In these studies, field magnitude and time of exposure were below the limits suggested by the two exposure guidelines available. Flow rate was calculated from the measured voltages and geometrical and electrical parameters using equations developed for three-media (body segment-vessel-blood) cylindrical models, based on electromagnetic theory. The 68 measurements reported here are in the expected range. (Author)

A80-21038 # **The effect of certain extremal factors on the human auditory function (Vozdeistvie nekotorykh ekstremal'nykh faktorov na slukhovuiu funktsiiu cheloveka).** V. V. Diskalenko. *Voenno-Meditsinskii Zhurnal,* Oct. 1979, p. 46-49. In Russian.

The paper summarizes data on the effects of certain extremal factors, including nervous-emotional stress, prolonged hypokinesia, and vestibular-optokinetic stimuli, on the auditory function of healthy people. These factors are typical for operators of military equipment and usually act together on the organism. The responses of the auditory system to such factors were studied from tonal audiograms, auditory discomfort levels, sensitivity to ultrasound, and data on auditory masking. Data indicate definite functional changes in the auditory system under the influence of the extremal factors. B.J.

A80-21039 # **The effect of aircraft noise on the functional state of human operators (Vliianie aviatsionnogo shuma na funktsional'noe sostoianie organizma operatorov).** V. I. Zorile, V. S. Kuznetsov, and G. I. Tarasenko. *Voenno-Meditsinskii Zhurnal,* Oct. 1979, p. 49-51. In Russian.

Noise intensity tests at 100, 110, and 120 dB were conducted on eight volunteers aged 25 to 40. The functions studied were auditory sensitivity threshold, heart rate, respiratory minute volume, operator task performance involving two-dimensional compensatory tracking, and a reserve ability to accept and process additional information that demands active redirection of attention. Results indicate that intense aircraft noise tends to produce changes in functional state and to reduce the psychophysiological reserve capabilities of the operator. B.J.

A80-21040 # **The effect of age and vitamin provision of pilots on their night vision characteristics (Vliianie vozrasta i vitaminnoi obespechennosti organizma letchika na pokazateli nochnogo zreniia).** V. V. Koblianskii. *Voenno-Meditsinskii Zhurnal,* Oct. 1979. p. 62, 63. In Russian.

STAR ENTRIES

N80-14669 California Univ., San Diego.
KINEMATIC ANALYSIS OF OSMOTIC PROCESSES UNDER NON-EQUILIBRIUM CONDITIONS Ph.D. Thesis
Huacuz Villamar 1979 126 p
Avail: Univ. Microfilms Order No. 7926696

The general conditions for osmotic flow are derived theoretically. It is shown that when a binary mixture is separated from one of its components by means of a barrier permeable only to that same component, a necessary and sufficient condition for the balance of linear momentum in the system is the flow of mass into the mixture, across the semipermeable barrier. The equations for osmotic equilibrium under different sets of forces are derived from the general equation of motion for the osmotic system. It is concluded that the presence of a semipermeable membrane is a sufficient condition for the net motion of the binary mixture from its original equilibrium position, but it is not necessary since the membrane could be substituted by any other 'external' force acting selectively on one of the components of the mixture. It is also concluded that osmotic flow in a binary mixture is a necessary and sufficient condition to balance the linear momentum of the system. The results are applied to a series of membranes of different permeabilities and are used to explain the process of water transport in living organisms.
Dissert. Abstr.

N80-14670# Materials Research Labs., Melbourne (Australia).
MICROBIAL COLONIZATION OF MATERIALS AT INNISFAIL, QUEENSLAND
F. John Upsher Aug. 1979 26 p refs Original contains color illustrations
(MRL-TN-428; AR-001-836) Avail: NTIS HC A03/MF A01

Materials were exposed under a glass canopy to investigate microbial colonization. Two series of exposures were made; one starting in the cool dry winter, the other in the hot-wet season. Growth of microorganisms was slow, particularly of algae which were not apparent until 30 weeks; tardiness was attributed to the samples being protected from rain so that the organisms were dependent upon atmospheric moisture and dew. An increase in the amount of growth was apparent after any week in which the mean relative humidity exceeded 87% or when 80% was exceeded for more than 125 hours. Cotton and wood provided the earliest growth and also supported the greatest amount and variety of fungi. Heavier growths were observed on acrylic paint and poly(vinyl chloride) after prolonged exposure. Cladosporium was the dominant fungal genus, being present on almost every occasion any fungus was detected. R.E.S.

N80-14671*# National Aeronautics and Space Administration, Washington, D. C.
MICROMORPHOLOGY OF NEUROHYPOPHYSIS OF RATS UNDER EXPERIMENTAL CONDITIONS
E. R. Meitner and E. Proksova Dec. 1979 7 p refs Transl. into ENGLISH from Biologia (Bratislava), v. 25, no. 12, 1970 p 857-860 Transl. by SCITRAN, Santa Barbara, Calif.
(Contract NASw-3198)
(NASA-TM-75947) Avail: NTIS HC A02/MF A01 CSCL 06C

The changes of the quantity of neurosecretory substance in neurohypophysis of rats under various experimental conditions are investigated. Comparing to the norm the quantity of neurosecretion after a long stay in the dark was larger. In animals subjected to immobilization stress the picture of neurohypophysis remained unchanged. It changed only in correlation with the administered water. Results indicate that the immobilization stress, in contradistinction to dolorose stress, has no substantial influence upon the quantity of neurosecretion in neurohypophysis. R.C.T.

N80-14672*# National Aeronautics and Space Administration, Washington, D. C.
RNA CONTENT IN MOTOR AND SENSORY NEURONS AND SURROUNDING NEUROGLIA OF MOUSE SPINAL CORD UNDER CONDITIONS OF HYPODYNAMIA AND FOLLOWING NORMALIZATION
V. A. Brumberg and L. Z. Pevzner Dec. 1979 15 p refs Transl. into ENGLISH from Tsitologiya (USSR), v. 10, no. 11, 1968 p 1452-1459 Transl. by Kanner (Leo) Associates, Redwood City, Calif. Original doc. prep. by Academy of Sci. (Leningrad)
(Contract NASw-3199)
(NASA-TM-75983) Avail: NTIS HC A02/MF A01 CSCL 06C

Male white mice were subjected to two and three week hypodynamia and then decapitated. Cytoplasmic RNA content per cell was measured by means of ultraviolet cytospectrometry. Changes in RNA content are shown, and the dynamics of the reparative processes of cells are discussed. R.C.T.

N80-14673*# National Aeronautics and Space Administration, Washington, D. C.
THE EFFECTS OF HYPODYNAMIA AND HYPOKINESIA ON THE ARTERIAL BED OF PELVIC LIMB MUSCLES IN THE RABBIT
N. E. Sokolov Dec. 1979 9 p refs Transl. into ENGLISH from Arkh. Anat., Gistol. Embriol. (USSR), v. 62, no. 4, 1972 p 48-52 Transl. by Kanner (Leo) Associates, Redwood City, Calif. Original doc. prep. by Pavlov First Leningrad Medical Inst.
(Contract NASw-3199)
(NASA-TM-75984) Avail: NTIS HC A02/MF A01 CSCL 06C

The effects of hypodynamia on the arterial bed in the muscles and adjacent structures in limbs of rabbits were subject to investigation. Anatomical methods of study showed that hypodynamia produced morphological changes in the intraorganic arterial system in the muscles, fascia, and adipose tissue of the immobilized limb. These changes proved stable and were retained for six months. Author

N80-14674*# National Aeronautics and Space Administration, Washington, D. C.
EFFECT OF RHYTHMIC PHOTOSTIMULATION ON MONKEYS WITH HYPERKINESIS OF POST-ENCEPHALITIC GENESIS
I. V. Danilov (USSR Academy of Medical Sciences) and N. N. Kudrayatseva (USSR Academy of Medical Sciences) Dec. 1979 12 p refs Transl. into ENGLISH from Fiziol. Zh. SSSR, (USSR), v. 68, no. 4, 1972 p 511-516 Transl. by Kanner (Leo) Associates, Redwood City, Calif.
(Contract NASw-3199)
(NASA-TM-75986) Avail: NTIS HC A02/MF A01 CSCL 06C

In hyperkinetic monkeys a response opposite to that of healthy monkeys was observed during rhythmic photostimulation (frequency 3, 9, 18, 20, and 25/sec), i.e., the hyperkinesis disappeared. The significance of rhythmic excitatory cycles for interconnections between different brain structures is discussed.
Author

N80-14675*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
A CONTROLLED RATE FREEZE/THAW SYSTEM FOR CRYOPRESERVATION OF BIOLOGICAL MATERIALS
V. J. Anselmo and R. G. Harrison 1 Jun. 1979 182 p Prepared for Union Carbide Co.
(Contract NAS7-100)
(NASA-CR-162531; JPL-Pub-79-91) Avail: NTIS HC A09/MF A01 CSCL 06B

A system which allows programmable temperature-time control for a 5 cc sample volume of an arbitrary biological material was constructed. Steady state and dynamic temperature control was obtained by supplying heat to the sample volume through

resistive elements constructed as an integral part of the sample container. For cooling purposes, this container was totally immersed into a cold heat sink. Sample volume thermodynamic property data were obtained by measurements of heater power and heat flux through the container walls. Using a mixture of dry ice and alcohol at -79 C, sample volume was controlled from +40 C to -60 C at rates from steady state to + or - 65 C/min. Steady state temperature precision was better than 0.2 C while the dynamic capability depends on the temperature rate of change as well as the thermal mass of the sample and the container. R.C.T.

N80-14676*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
INVESTIGATION OF EFFECTS OF TEMPERATURE, SALINITY, AND ELECTRODE DESIGN ON THE PERFORMANCE OF AN ELECTROCHEMICAL COLIFORM DETECTOR
David C. Grana Nov. 1979 54 p refs
(Contract EPA-IAG-D7-0053)
(NASA-TM-80130; EPA-600/4-79-075) Avail: NTIS HC A04/MF A01 CSCL 06B

The results of two research programs to determine the optimum detector design for measuring fecal coliforms in saline waters for operational systems are presented. One program was concerned with the effects of temperature and salinity on endpoint response time, and the other, the interaction between electrode configurations and the test organisms. Test results show that the endpoint response time is related to salinity and seawater temperature; however, these results can be minimized by the correct choice of growth media. Electrode configurations were developed from stainless steel, Parlodion-coated stainless steel, and platinum that circumvented problems associated with the commercial redox electrodes. M.G.

N80-14677# European Space Agency, Paris (France).
BIOLOGY AND MEDICINE IN SPACE: RESEARCH OPPORTUNITIES OFFERED BY SPACELAB. AN INVITATION TO EUROPEAN INVESTIGATORS
Hilding Bjurstedt, ed. Aug. 1979 56 p refs
(ESA-BR-01) Avail: NTIS HC A04/MF A01; ESA, Paris FF 50

The results and experience gained from experiments in space, the current position, and the research opportunities envisaged for the future are reviewed by biologists and medical scientists for the purpose of encouraging investigators to propose experiments, and to disseminate information to the life sciences community. The main subjects covered are: Spacelab, areas of research opportunity, human physiology, cell and developmental biology, plant biology, radiobiology, exobiology and bioengineering. Author (ESA)

N80-14678# Advisory Group for Aerospace Research and Development, Paris (France).
RECENT ADVANCES IN AERONAUTICAL AND SPACE MEDICINE
Raymond H. Murray, ed. (Mich. State Univ., East Lansing) Sep. 1979 80 p refs In ENGLISH and FRENCH Presented at the Aerospace Med. Panel's Spec. Meeting, Brussels, 22-26 Jan. 1979
(AGARD-CP-265; ISBN-92-835-0250-7) Avail: NTIS HC A05/MF A01

The selection and life support of aircrews and spacecrews, including the European payload specialists for shuttle/Spacelab missions are discussed. Physiological factors in space operations are examined, as well as the medical and physiological problems addressed during the development and operation of commercial supersonic vehicles.

N80-14679# Advisory Group for Aerospace Research and Development, Paris (France).
PROBLEMS RELATED TO MEDICAL CRITERIA FOR THE SELECTION OF MILITARY NAVIGATION PERSONNEL [PROBLEMES RELATIFS AUX CRITERES MEDICAUX DE SELECTION DU PERSONNEL NAVIGANT MILITAIRE]
E. Evrard *In its* Recent Advan. in Aeron. and Space Med. Sep. 1979 22 p refs In FRENCH

Avail: NTIS HC A05/MF A01

Visual, auditory and vestibular, and psychological or psychiatric criteria for personnel selection are considered. Specific problems discussed relate to (1) special possible criteria for determining precociousness and the immediate problem of the specialization of operational personnel; (2) a possible raising of the standards for aviators destined to pilot new generation fighter aircraft; and (3) female navigational personnel. The standardization of visual and auditory criteria is recommended as well as additional research on the problems considered in order to reduce the rate of elimination during the pilot training course. Transl. by A.R.H.

N80-14680# Royal Air Force Inst. of Aviation Medicine, Farnborough (England).
AN ADVANCED OXYGEN SYSTEM FOR FUTURE COMBAT AIRCRAFT
J. Ernsting *In* AGARD Recent Advan. in Aeron. and Space Med. Sep. 1979 17 p refs

Avail: NTIS HC A05/MF A01

The operational and physiological requirements for an advanced oxygen system for future high performance combat aircraft are considered and reviewed. It is concluded that such an oxygen system should employ a molecular sieve on board oxygen generation system, pressure premix for dilution of the oxygen by air and a twin demand regulator package. The principles of operation of such a system are considered and a design is proposed. Author

N80-14681# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Bonn (West Germany). Inst. fuer Flugmedizin.
THE EUROPEAN APPROACH TO THE SELECTION AND TRAINING OF SL PAYLOAD SPECIALISTS
K. E. Klein and J. R. Hordinsky *In* AGARD Recent Advan. in Aeron. and Space Med. Sep. 1979 12 p refs

Avail: NTIS HC A05/MF A01

The completed selection of European payload specialists (PS) for the first Spacelab mission (SL-1) is described. Future developments in European selection programs are projected. The immediate training requirements for the SL-1 PS are described. The integration of such varied training categories as biomedical and physical with the more general SL experiment training is reviewed. The usefulness of mission simulations is also discussed. Author

N80-14682*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
PHYSIOLOGICAL FACTORS IN SPACE OPERATIONS. EMPHASIS ON SPACE SHUTTLE
Sam L. Pool, Paul C. Rambaut, and Jerry L. Homick *In* AGARD Recent Advan. in Aeron. and Space Med. Sep. 1979 12 p refs
Avail: NTIS HC A05/MF A01 CSCL 06P

Problems such as space motion sickness, redistribution of body fluids, and cardiovascular deconditioning are of concern in short-duration space shuttle flights. The expanded participation of nonastronaut crewmembers or payload specialists in these flights increases the life scientists' interest in the space shuttle flights. Problems such as loss of skeletal mass, decreased red blood cell production, and numerous endocrine changes are of more concern on long-duration flights. The Life Sciences Program is therefore concerned with a wide variety of problems that range from the applied to the basic. The common thread is biology; the context is space. Several physiological factors associated with space shuttle operations are summarized including space motion sickness, cardiovascular deconditioning, bone and muscle loss, hematology, fluid and electrolyte changes, reentry g-forces, radiation safety, noise, atmosphere, extravehicular activity, toxicology, nutrition, biowaste, and health maintenance. Author

N80-14683# Medical de l'Aeronautique Civile, Paris (France).
SUPERSONIC AERIAL TRANSPORT: MEDICAL AND PHYSIOLOGICAL ASPECTS [LE TRANSPORT AERIEN SUPERSONIQUE ASPECTS MEDICO-PHYSIOLOGIQUES]

Jean Raboutet *In* AGARD Recent Advan. in Aeron. and Space Med. Sep. 1979 7 p In FRENCH

Avail: NTIS HC A05/MF A01

From 1964 to 1974, two medical subgroups, one French and one British, researched the medical and physiological problems presented by supersonic air transportation. All the problems were addressed by committees of specialists that included physicians, physicists, chemists, and engineers. Thus, the loss of pressurization, ozone, ionizing radiation, noise, visual problems, and air conditioning were the objects of profound study. Very satisfying solutions were found. In certain cases, notably ozone and cosmic radiation, it could be proved that it was a matter of false problems, and that supersonic flight at 17,000 meters offered no danger. As the consequence of all the favorable results obtained, the Concorde could easily obtain the authorization necessary for flight.

Transl. by A.R.H.

N80-14684* National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
INTRA-OCULAR PRESSURE NORMALIZATION TECHNIQUE AND EQUIPMENT Patent

Edward F. Baehr, inventor (to NASA) Issued 12 Jun. 1979 5 p Filed 31 Aug. 1977 Supersedes N77-30736 (15 - 21, p 2839)
(NASA-Case-LEW-12955-1; US-Patent-4,157,718; US-Patent-Appl-SN-829318; US-Patent-Class-128-276) Avail: US Patent and Trademark Office CSCL 06B

A method and apparatus is described for safely reducing abnormally high intraocular pressure in an eye during a predetermined time interval. This allows maintenance of normal intraocular pressure during glaucoma surgery. A pressure regulator of the spring-biassed diaphragm type is provided with additional bias by a column of liquid. The hypodermic needle can be safely inserted into the anterior chamber of the eye. Liquid is then bled out of the column to reduce the bias on the diaphragm of the pressure regulator and, consequently, the output pressure of the regulator. This lowering pressure of the regulator also occurs in the eye by means of a small second bleed path provided between the pressure regulator and the hypodermic needle.

Official Gazette of the U.S. Patent and Trademark Office

N80-14685 Kansas State Univ., Manhattan.
MODELING OF BLOOD FLOW IN VESSELS OF THE MICROCIRCULATION Ph.D. Thesis

Pattarapan Prasassarakich 1979 178 p
Avail: Univ. Microfilms Order No. 7926572

A mathematical model of blood flow in rigid straight cylindrical and tapered tubes was developed. The similarity between blood flow in small vessels with oil water flow in glass tubes was investigated. A concentric annular flow (CAF) model with a cell free plasma layer surrounding a continuous core of cells was proposed to describe blood flow in small tubes < 400 micrometers. The resulting pressure flow behavior calculated from this model agrees very well with experimental results. The plasma layer was found to be a constant; independent of shear stress, tube diameter, and feed hematocrit. Results also indicate that the CAF model qualitatively predicts the Fahraeus effect and quantitatively predicts the Fahraeus-Lindqvist effect.

Dissert. Abstr.

N80-14686 California Univ., Riverside.
THE INTERACTION OF OZONE WITH THE HUMAN ERYTHROCYTE Ph.D. Thesis

Alan Edward Koontz 1979 246 p
Avail: Univ. Microfilms Order no. 7924289

In order to examine the biochemical events of oxidant injury which lead to edema, the human red blood cell studied after exposure in vitro to high concentrations (45 nMoles or O3/10 to the 6th power cells maximum) of oxone for short periods. Changes in outdated cells, pre-incubated with adenosine to restore ATP levels, in outdated cells not pre-incubated, and in resealed ghosts produced from the outdated cells are described. The sensitivity of certain membrane sites such as glyceraldehyde-3-phosphate dehygrogenase and the ouabain binding site evidences the reactivity of oxone with a relatively small number of membrane components, which may be responsible for the generation of a permeability change, cation pump inhibition, or membrane structural modification in the absence of gross internal oxidation, leading to edematous conditions in red cells and other tissues exposed to oxidants.

Dissert. Abstr.

N80-14687* National Aeronautics and Space Administration. Pasadena Office, Calif.
DIALYSIS SYSTEM Patent

William A. Mueller, inventor (to NASA) (JPL) Issued 13 Jun. 1978 6 p Filed 28 Feb. 1977 Sponsored by NASA
(NASA-Case-NPO-14101-1; US-Patent-4,094,775; US-Patent-Appl-SN-772434; US-Patent-Class-210-22; US-Patent-Class-210-321B) Avail: US Patent and Trademark Office

The improved hemodialysis system utilizes a second polymeric membrane having dialyzate in contact with one surface and a urea decomposition solution in contact with the other surface. The membrane selectively passes urea from the dialyzate into the decomposition solution, while preventing passage of positively charged metal ions from the dialyzate into the solution and ammonium ions from the solution into the dialyzate.

Official Gazette of the U.S. Patent and Trademark Office

N80-14688*# National Aeronautics and Space Administration, Washington, D. C.
EFFECT OF PROLONGED HYPOKINESIA ON TISSUE BLOOD FLOW

Z. P. Levites and V. F. Fedotova Dec. 1979 7 p refs Transl. into ENGLISH from Eksp. Khir. Anesteziol. (USSR) no. 3, May/Jun. 1974 p 79-80 Transl. by Scientific Translation Service, Santa Barbara, Calif.
(Contract NASw-3198)
(NASA-TM-76005) Avail: NTIS HC A02/MF A01 CSCL 06P

The influence of hypokinesia on the blood flow in the tissues of rabbits was studied. Motor activity of animals was restricted during 90 days and blood flow recorded through resorption rate of NaI-131. Perfusion of tissues under the influence of hypokinesia was found to be reduced.

Author

N80-14689*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
SYNTHESIS AND BIOLOGICAL SCREENING BY NOVEL HYBRID FLUOROCARBON HYDROCARBON COMPOUNDS FOR USE AS ARTIFICIAL BLOOD SUBSTITUTES Second Annual Report, Jul. 1977 - Jul. 1978

J. Moacanin, K. Scherer, A. Toronto (Utah Biological Test Lab., Salt Lake City), D. Lawson, T. Terranova, A. Yavrouian, L. Astle (Utah Biological Test Lab., Salt Lake City), S. Harvey (Utah Biological Test Lab., Salt Lake City), and D. H. Kaaelble (Rockwell Intern., Thousand Oaks, Calif.) 15 Oct. 1979 276 p refs Sponsored in part by NIH
(Contract NAS7-100)
(NASA-CR-162537; JPL-Pub-79-36) Avail: NTIS HC A13/MF A01 CSCL 06A

A series of hybrid fluorochemicals of general structure R(1)R(2)R(3)CR(4) was prepared where the R(i)'s (i = 1,2,3) is a saturated fluoroalkyl group of formula C sub N F sub 2n+1, and R(4) is an alkyl group C sub n H sub 2n+1 or a related moiety containing amino, ether, or ester functions but no CF bonds. Compounds of this class containing approximately eight to twenty carbons total have physical properties suitable for use as the oxygen carrying phase of fluorochemical emulsion artificial blood. The chemical synthesis, and physical and biological testing of pure single isomers of the proposed artificial blood candidate compounds are included. Significant results are given.

R.C.T.

N80-14690# Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio.
DERIVATION OF PRESBYCUSIS AND NOISE INDUCED PERMANENT THRESHOLD SHIFT (NIPTS) TO BE USED

FOR THE BASIS OF A STANDARD ON THE EFFECTS OF NOISE ON HEARING

Daniel L. Johnson Sep. 1978 53 p refs Sponsored in part by EPA
(AF Proj. 7231)
(AD-A071310; AMRL-TR-78-128) Avail: NTIS HC A04/MF A01 CSCL 06/19

This report provides various sets of tables that attempt to summarize much of the existing knowledge of the expected effects of noise on the hearing threshold levels of a population. Relations between noise exposure and Noise Induced Permanent Threshold Shift (NIPTS) for different audiometric frequencies are provided. Six different data sets of presbycusis (the effects of aging on hearing thresholds) are provided. Details for combining the effect of NIPTS to different presbycusis bases are provided. Three methods are suggested for presentation of hearing loss data. These are: (1) direct use of NIPTS, (2) calculation of hearing risk (the change in percent of the population whose hearing exceeds a certain value, and (3) use of a value (called units of potential compensation) that is related to the total compensation that might be paid due to hearing loss. The last method is new and was developed especially because of criticisms of the first two methods. The combined average of the frequencies of 500 Hz, 1000 Hz, 2000 Hz and 3000 Hz are analyzed in great detail and 10 tables are provided for describing the effects of noise on this frequency combination. A computer program for calculating hearing risk and units of potential compensation is provided. GRA

N80-14691# Army Research Inst. of Environmental Medicine, Natick, Mass.

THREE INSTRUMENTS FOR ASSESSMENT OF WBGT AND A COMPARISON WITH WGT (BOTSBALL)

B. Onkaram, L. A. Stroschein, and R. F. Goldman 14 Sep. 1979 28 p refs
(DA Proj. 3E1-62777-A-845)
(AD-A074979; USARIEM-M-24/79) Avail: NTIS HC A03/MF A01 CSCL 06/19

Environmental heat stress, expressed as the ambient wet bulb globe temperature (WBGT), was measured using three different WBGT instruments: (a) the conventional shaded dry bulb, 15.2 cm black globe and naturally convected wet bulb thermometers; (b) a miniaturized thermometer kit; (c) a commercial WBGT instrument using thermistor sensors, and the WBGT was compared with (d) the ambient wet globe temperature (WGT) measured by a Botsball. Visual observations were made on the instruments at regular intervals and an automated data collection system was also used to obtain data from thermocouples attached to the instruments. Statistically significant differences in WBGT readings were found among the instruments; however, the difference for a given environment was usually less than 0.5 C. Readings taken by visual observations resulted in WBGT values which differed by less than 0.3 C from those calculated from the automated data collection system. By using an equation derived for the Botsball, WBGT - 1.044 WGT - 0.187 in C, it is possible to convert the Botsball thermometer dial to indicate the conventional WBGT for outdoor environments; it then becomes a simple instrument for assessing environmental heat stress at the work site. GRA

N80-14692# Anthropology Research Project, Yellow Springs, Ohio.

ANTHROPOMETRIC SIZING, FIT-TESTING AND EVALUATION OF THE MBU-12/P ORAL-NASAL OXYGEN MASK

Milton Alexander (Aerospace Med. Res. Lab.), John T. McConville, and Ilse Tebbets Wright-Patterson AFB AMRL Aug. 1979 33 p refs
(Contract F33615-79-C-0511; AF Proj. 7184)
(AD-A074723; AMRL-TR-79-44) Avail: NTIS HC A03/MF A01 CSCL 06/17

This report describes the anthropometric sizing procedures used in the developement of the MBU-12/P oral-nasal oxygen mask and documents results of subsequent fit-testing and evaluation of the mask. A successor to the MBU-5/P, the MBU-12/P is designed to withstand the G and Q forces in the newer high performance aircraft as well as to provide a better fit and improved visibility. Sizing analysis and fit-testing revealed that four sizes of the MBU-12/P are sufficient to cover the USAF male flying population; the anthropometry and statistics upon which this decision was based are described in this report. Also documented here are the results of a number of ground and flight tests conducted over a period of four years which provide both objective and subjective evidence that the MBU-12/P is a well fitting mask which successfully achieves its design objectives. Subjects of all the tests were experienced aircrew whose head and face measurements were representative of a full range of the USAF flight crew population. Results of all the fit test/evaluations revealed a high degree of user acceptance and a decided preference for the MBU-12/P when compared to the older MBU-5/P. GRA

N80-14693# Armed Forces Radiobiology Research Inst., Bethesda, Md.

EARLY TRANSIENT INCAPACITATION: A REVIEW WITH CONSIDERATION OF UNDERLYING MECHANISMS

D. O. Carpenter Apr. 1979 19 p refs
(AD-A071803; AFRRI-SR-79-1) Avail: NTIS HC A02/MF A01 CSCL 06/18

Early transient incapacitation (ETI), which is a decrement in the performance of a specified task resulting from the effects of supralethal ionizing radiation exposures, has been observed in a number of animal species. Since nuclear weapons result in radiation fields sufficient to cause ETI in personnel that may be exposed, an understanding of the mechanism of this phenomenon is essential for the development of a rational plan for preventing or reversing the effect. This report is a review of the behavioral experiments concerning ETI and presents a critical analysis of available experimental information as to the cause of the phenomenon. It appears that the primary cause of ETI in experimental animals is probably faintness resulting from a fall in cerebral blood flow due to the direct action of histamine on blood vessel smooth muscle cells. GRA

N80-14694# Naval Postgraduate School, Monterey, Calif.

A CONSIDERATION OF FACTORS CONTRIBUTING TO STRENGTH DIFFERENCES IN MEN AND WOMEN M.S. Thesis

Theodore M. Printy Jun. 1979 80 p refs
(AD-A072671) Avail: NTIS HC A05/MF A01

The expansion of opportunities for women in today's military has increased the importance of understanding how and why men and women differ in strength, stamina, and work capacity. The present effort discusses how the different physiological/anatomical characteristics of the sexes form a basis for physical strength differences. Other factors, such as age, stature, weight, cultural influences, biomechanics, and training contribute to the significant differences in physical strength capabilities which are demonstrated both as to scope and degree. With an understanding of the strength capabilities of men and women and a comprehensive understanding of job requirements, the effective and efficient utilization of both sexes may be achieved. GRA

N80-14695# Ohio State Univ., Columbus. Dept. of Engineering Mechanics.

MEASUREMENT OF RESISTIVE TORQUES IN MAJOR HUMAN JOINTS Final Report, 1 Apr. 1976 - 30 Sep. 1978

Ali Erkan Engin Wright-Patterson AFB AMRL Apr. 1979 156 p refs
(Contracts F33615-76-C-0505; DOT-HS-6-01331; AF Proj. 2312)
(AD-A071170; AMRL-TR-79-4) Avail: NTIS HC A08/MF A01 CSCL 06/16

The major articulating joints considered are the shoulder, knee, hip, elbow and ankle. Due to drastic postmortem changes of the biomechanical response of the body tissues, the research is conducted with some obvious limitations on live human subjects. The major components of the specially designed and built experimental apparatus are a subject restraint system, a global force applicator (GFA), and an exoskeletal device (ESD). The ESD is used in monitoring the kinematics of the motion between the fixed and the moving body segments and the forces are

applied to the moving body segment by means of the GFA. Design of both the ESD and GFA are similar, each containing eight high precision potentiometers. The experimental apparatus and the associated theoretical concepts are utilized to achieve at least three major tasks. These tasks are the quantitative determination of (a) the voluntary range of motion (b) the resistive force and moments and (c) the resistive torques for the rotational motion of the body segments about their long bone axes. Although the majority of the results presented are on the passive resistive force, moment and torques for the major articulating joints of three subjects, some results on the magnitudes of the active resistive muscle force, moment and torque vectors are also presented for the same subjects. GRA

N80-14696# Illinois Univ. at the Medical Center, Chicago. School of Public Health.
HEALTH EFFECTS OF AEROSOLS EMITTED FROM AN ACTIVATED SLUDGE PLANT
B. Carnow, R. Northrop, R. Wadden, S. Rosenbert, and J. Holden May 1979 232 p refs
(Grant EPA-R-805003)
(PB-299583/5; EPA-600/1-79-019) Avail: NTIS HC A11/MF A01 CSCL 06F

The health of persons residing near sewage treatment plants was studied to determine whether or not the health of persons exposed to aerosols emitted by a sewage treatment plant is significantly different from persons living in lesser exposed areas around the plant site. GRA

N80-14697*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
PRELIMINARY INVESTIGATION OF PILOT SCANNING TECHNIQUES OF DIAL POINTING INSTRUMENTS
Randall L. Harris, Sr. Nov. 1979 22 p refs
(NASA-TM-80079) Avail: NTIS HC A02/MF A01 CSCL 05H

Two pilots' methods of looking at instruments with needle pointers in a fixed base helicopter simulation were observed. A total of 45 runs were analyzed for each pilot. The data indicated that two apparently different techniques were being used; one looking at the needle point, the other looking at a fixed spot on the instrument and reading the needle direction parafoveally. The latter technique is found to be somewhat faster with both pilots accomplishing the flying task. M.G.

N80-14698# Decisions and Designs, Inc., McLean, Va.
VALIDATION AND ERROR IN MULTIPLICATIVE UTILITY FUNCTIONS Research Report, Oct. 1977 - Dec. 1978
F. Hutton Barron Dec. 1978 52 p refs Prepared in cooperation with Univ. of Southern California
(Contract N00014-76-C-0074)
(AD-A073362; USC-001922-2-T; SSRI-RR-78-2) Avail: NTIS HC A04/MF A01 CSCL 05/10

In this report an approach to the concept of error in utility assessment is proposed. Three components of error are considered and each component is related to four separate elicitation methods-all in the context of a general multiplicative multiattribute utility model. The methods are Keeney-Raiffa (1976) procedure, SMART (Edwards, 1977), a social judgment theory (SJT) based regression model (Hammond, Stewart, Brehmer and Steinmann, 1975) and a new method called Holistic Orthogonal Parameter Estimation or HOPE (Barron and Person, 1978). If a general multiplicative model can be assumed to be an appropriate representation of the decision maker's basic preference structure, error can occur in the direct estimation of the scaling constants and univariate utility functions for decomposition methods (Keeney-Raiffa and SMART), or in the holistic assessments for holistic methods (SJT and HOPE). Individual estimates may be merely noisy or may be fundamentally incorrect. Furthermore, the utility model may be incorrectly specified; for example, an additive model, rather than a multiplicative model, may be used. The four assessment methods are considered in conjunction with errors of each kind. Author (GRA)

N80-14699# University of Southern California, Los Angeles. Social Science Research Inst.
A CRITERION VALIDATION OF MULTIATTRIBUTE UTILITY ANALYSIS AND OF A GROUP COMMUNICATION STRATEGY Research Report, Oct. 1977 - Dec. 1978
Lee C. Eils, III and Richard S. John Dec. 1978 53 p refs Prepared for Decisions and Designs, Inc., McLean, Va.
(Contract N00014-76-C-0074)
(AD-A073364; USC-001922-4-T; SSRI-RR-78-4) Avail: NTIS HC A04/MF A01 CSCL 05/10

This study investigates the use of an external criterion for validating additive utility assessments under certainty. Utilities were elicited from twenty-four groups via consensus judgment for ten hypothetical applicants for bank credit cards. The research design completely crossed two factors relevant to group utility assessment: (1) using a decomposition (MAUA) procedure or not, and (2) using a formal group communication strategy or not. The quality of each group's utility judgments was defined to be the Pearson produce-moment correlation between the group's judged utilities and utilities output from a configural (nonlinear) model used by Security Pacific National Bank in evaluating applicants for Master Charge. Group satisfaction measures were also obtained. The decomposition methodology and the group communication strategy both aided groups in making assessments that are more consistent with those of the bank model, which is based on a systematic collection and interpretation of a large amount of relevant data. Simplified procedures for obtaining weight parameters in the multi-attribute utility analysis yielded better overall utilities than more complicated ratio-estimation techniques. GRA

N80-14700# Decisions and Designs, Inc., McLean, Va.
IMPORTANCE WEIGHT ASSESSMENT FOR ADDITIVE, RISKLESS PREFERENCE FUNCTIONS: A REVIEW Research Report, Oct. 1977 - Dec. 1978
Richard S. John and Ward Edwards Dec. 1978 72 p refs Prepared in cooperation with Univ. of Southern California
(Contract N00014-76-C-0074)
(AD-A073365; USC-001922-5-T; SSRI-RR-78-5) Avail: NTIS HC A04/MF A01 CSCL 05/10

One of the more useful tools in decision analysis is the riskless, additive multiattribute utility (MAU) model. The most difficult task in the application of MAU models is that of estimating the importance weight parameters. Two general approaches to the weight estimation problem are extensively reviewed in the present paper: direct subjective estimation and indirect holistic estimation. Various methods for directly assessing importance weights are catalogued, including ranking, fractionation, subjective-estimate methods, and paired-comparison procedures, and their relationship to one another is discussed. The so-called indirect holistic methods, including unbiased and biased regression analyses, the ANOVA and fractional ANOVA paradigms, and the indifference techniques of pricing out and trading off to the most important dimension, are all explained with particular emphasis on their common relationship to the general linear model. Author (GRA)

N80-14701# Decisions and Designs, Inc., McLean, Va.
ARE IMPORTANT WEIGHTS SENSITIVE TO THE RANGE OF ALTERNATIVES IN MULTIATTRIBUTE UTILITY MEASUREMENT Research Report, Oct. 1977 - Dec. 1978
William F. Gabrielli, Jr. and Detlof VonWinterfeldt Dec. 1978 47 p refs Prepared in cooperation with Univ. of Southern California
(Contract N00014-76-C-0074)
(AD-A073366; USC-001922-6-T; SSRI-RR-78-6) Avail: NTIS HC A03/MF A01 CSCL 05/10

Scaling factors in multiattribute utility measurement can either be assessed directly as importance weights or indirectly by indifference judgments. Critics of the importance weight interpretation of scaling factors argue that importance weights are not sensitive to ranges of alternatives and thus cannot be used to match standardized single attribute utility functions. To examine the range sensitivity of importance weight judgments two experiments were designed. In the first experiment college students gave relative importance weight judgments for a number of attributes when evaluating apartments and liquified natural gas plant locations. After the initial importance weight assessments

the range of alternatives in one attribute was changed and subjects reassessed their weights. Although subjects were explicitly instructed to take ranges into account when making these judgments, they were unable to adjust their weights appropriately. To magnify possible range effects a second experiment examined a very simple two attribute car evaluation problem. Subjects were asked directly if weights should change after the range in one attribute was doubled. Most subjects indicated that there should be no change. The results of these experiments suggest that subjects have plausible ranges in mind when assessing importance weights and that they are unwilling to change weights after relatively spurious changes in the alternative set.
Author (GRA)

N80-14702# Decisions and Designs, Inc., McLean, Va.
SUBJECTIVE VERSUS STATISTICAL IMPORTANCE WEIGHTS. A CRITERION VALIDATION Research Report, Oct. 1977 - Dec. 1978
Richard S. John and Ward Edwards Dec. 1978 52 p refs
Prepared jointly with Univ. of Southern Calif., Los Angeles
(Contract N00014-76-C-0074)
(AD-A073367; SSRI-RR-78-7; USC-001922-7-T) Avail: NTIS HC A04/MF A01 CSCL 05/10

The present paper proposes a research paradigm for comparing weight estimates to empirically derived 'true' weights, thus obtaining a measure of the criterion validity of different weight estimation techniques. Subjects are first taught a multi-attribute utility (MAU) model via multiple-cue probability learning (MCPL) and outcome feedback. Then, various assessments of the importance weight parameters for the model attributes are obtained. Composites formed from these weights are subsequently compared to composites formed from optimal statistical weights derived from outcome feedback. Data are reported from 17 subjects who were taught one of three 'diamond worth' MAU models in 100 feedback trials. The models all involved four attributes (cut, color, clarity, and carat weight), and varied in the 'environmental correlations' among the dimensions (either (1) all uncorrelated, (2) one large positive correlation, or (3) two large negative correlations). The results of the present study are discussed from both an applied and theoretical perspective. To the decision analyst in the field, the present results give support to the belief that the parameter estimates obtained from clients define a 'true' normative preference function. Theoretically, the findings of this study are strong evidence that people are aware of their own cognitive processes. GRA

N80-14703# Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio.
EFFECT OF PERIPHERALLY PRESENTED VISUAL SIGNALS ON PILOT PERFORMANCE DURING FLIGHT SIMULATION Final Technical Report, Oct. 1977 - Sep. 1978
John M. Bermudez, Jock C. H. Schwank, Thomas M. Longridge, Thomas M. McCloy, and Bruce A. Smith Jun. 1979 21 p refs
(AF Proj. 7184)
(AD-A073604; AMRL-TR-78-120) Avail: NTIS HC A02/MF A01 CSCL 05/5

Recent theoretical developments have stimulated interest in the development and testing of peripheral vision displays which could be used to monitor the control of aircraft attitude. This study investigated the ability of pilots to attend to peripherally presented attitude information via LED displays while simultaneously engaging in foveal processing of an instrument array during a complex maneuver in flight simulator. Twenty-four pilots were divided into two groups of twelve. One group performed vertical S maneuvers using an LED display that indicated an out-of-tolerance condition in compass heading (steady LED). The second group used an LED that provided both out-of-tolerance information and rate-of-error information (strobe LED). All pilots were pre-trained to criterion. Both groups performed under each of three display conditions: Normal (standard round compass dial), Redundant (dial and LED), and Peripheral (LEDs-only). There were no statistically significant differences between the steady LED display and the strobing LED display. Overall, the results suggest that peripheral displays are at least as effective as compass dials for monitoring purposes, and such displays might prove useful as adjunct training aids with the potential for improving safety. Author (GRA)

N80-14704# Army Military Personnel Center, Alexandria, Va.
A STUDY IN PROCEDURAL MANIPULATION OF LOCUS OF CONTROL M.S. Thesis - North Carolina Central Univ. Final Report
Vernon Webster Hatley 13 Apr. 1979 72 p refs
(AD-A068658) Avail: NTIS HC A04/MF A01 CSCL 05/10

Specific locus of control change techniques were developed, examined and tested on one hundred twenty-eight (128) matched students in a general psychology class at North Carolina Central University during the spring semester of 1979. This study investigated the possibility of changing locus of control orientation in college students. Additionally, pretest locus of control scores of students who dropped the course were compared with those completing it. The experimental design was a two by four (2 x 4) matched group design. Presumed change in pretest-posttest locus of control scores as measured by Rotter's Internal External Locus of Control Scale and pretest locus of control scores of students who dropped the course were the dependent variables. Results revealed that locus of control scores in the experimental group shifted significantly (p less than .05) in the internal direction while those in the control condition moved toward an external orientation. Externals in the experimental group contributed significantly (p less than 0.5) to the overall change. Internals were found to move toward externality. The findings confirmed the contention that locus of control orientation can be influenced toward internality. Recommendations are offered for use of locus of control intervention techniques in academic settings.
Author (GRA)

N80-14705# Johns Hopkins Univ., Baltimore, Md. Div. of Behavioral Biology.
EXTENDED ANALYSIS OF SMALL GROUP PERFORMANCE AND THE EFFECTS OF CONTINGENCY MANAGEMENT IN A PROGRAMMED ENVIRONMENT
H. H. Emurian and J. V. Brady 16 Apr. 1979 30 p refs
(Contract N00014-77-C-0498; NR Proj. 170-855)
(AD-A068665; TR-4) Avail: NTIS HC A03/MF A01 CSCL 05/10

Volunteer subjects have participated in a series of experimental group missions involving continuous residence for varying periods in the programmed environment. The methodology involved in these ongoing studies extends the applications of performance programming technologies detailed in prior publications. The experiments focus upon an explicit analysis of the conditions under which interrelationships between participants and experimenters influence performance effectiveness. To assess potential interrelationships between physiological status and performance effectiveness and productivity, four measures were obtained while subjects concurrently operated the performance battery: (1) heart rate, (2) frontalis EMG, (3) skin temperature, and (4) skin conductance. Urine free cortisol levels were also determined from analyses of total urine volume which was collected throughout the mission. A strong overall relationship was observed between individual productivity and mean daily urine free cortisol. These observations together suggest that the stress of sustained high productivity along with prolonged performance accuracy on a demanding task may render an individual vulnerable to disruptive emotional reactions such as those provoked by the avoidance phase of the study. Author (GRA)

N80-14706# Maryland Univ., College Park. Dept. of Psychology.
ABILITY, INVOLVEMENT AND CLIMATE AS MULTIPLE AND INTERACTIVE PREDICTORS OF PERFORMANCE
R. Gene Hoffman Apr. 1979 41 p refs
(Contract N00014-75-C-0884; RR0420402)
(AD-A068891; RR-21) Avail: NTIS HC A03/MF A01 CSCL 05/10

Student ability, involvement in the class, and classroom climate created by the instructor activities were examined as multiple and interactive predictors of course performance for 915 students in 74 sections of a mathematics course. Climate

was defined in two ways: (1) as individual perceptions and (2) as shared perceptions. Two parallel analyses were conducted using the two definitions of climate. Each analysis resulted in ability, involvement and climate contributing unique variance in the prediction of student examination performance on a common exam. Climate dimensions contributing to performance were coordination of class activities, instructor skill, and the extent of critical demands (a negative relationship). The most significant difference between the two analyses was the appearance of a significant ability X coordination interaction in the analysis using shared climate perceptions. This difference was interpreted to be the result of a confounding of the interaction in the individual perceptions of coordination. The relationship between the interaction and predictive accuracy was explored. GRA

N80-14707# Maryland Univ., College Park. Dept. of Physics.
WORK PERFORMANCE AS A FUNCTION OF THE INTERACTION OF ABILITY, WORK VALUES, AND THE PERCEIVED WORK ENVIRONMENT
Robert Lee Hannon Apr. 1979 165 p refs
(Contract N00014-75-C-0884; RR0420402)
(AD-A068893; RR-22) Avail: NTIS HC A08/MF A01 CSCL 05/10

Literature pertaining to the prediction of performance from ability, motivation and their interaction was reviewed. Three personal traits (achievement motivation, locus of control, and bureaucratic values) are examined as possible antecedents of work motivation and performance. A model of work motivation that depends on the strength of the personal traits interacting with their environmental compatibility was developed. An empirical study on 417 police officers was conducted to test hypotheses generated from the models. Measures of the personal traits were developed and administered along with a questionnaire used to ascertain perceptions of the work environment. Supervisor's ratings of performance were collected as well as demographic and ability measures. Moderated multiple regression analyses found strong evidence for the performance-related validity of the work motivation model. Neither ability nor the ability-motivation interaction showed any relationship to performance. GRA

N80-14708# Maryland Univ., College Park. Dept. of Psychology.
METHODOLOGICAL AND CONCEPTUAL ISSUES IN UNDERSTANDING ABILITY-PERFORMANCE RELATIONSHIPS Final Report
Benjamin Schneider Apr. 1979 36 p refs
(Contract N00014-75-C-0884; RR0420402)
(AD-A068894; RR-25) Avail: NTIS HC A03/MF A01 CSCL 05/10

This final report presents summaries of a series of technical reports concerned with individual non-ability and contextual variables as contributions to ability-performance relationships and the prediction of work performance. Theoretical papers and laboratory and field research efforts are summarized. It was concluded that situational variables conceptualized and operationalized in a number of different ways contribute additively, but not interactively, to the prediction of performance. Also included in this report is a list of publications accomplished under this contract. GRA

N80-14709# Arizona State Univ., Tempe. Dept. of Educational Technology.
RULE LEARNING AND SYSTEMATIC INSTRUCTION IN PILOT TRAINING Final Report, 1 Oct. 1977 - 31 Dec. 1978
Vernon S. Gerlach Mar. 1979 30 p
(Grant AF-AFOSR-2900-76; AF Proj. 2313)
(AD-A068906; TD-3; AFOSR-79-0609TR) Avail: NTIS HC A03/MF A01 CSCL 05/9

Four related lines of endeavor were pursued. Central to these activities was the research on algorithmized instruction as a form of rule learning and its effect on the acquisition of complex human behaviors. This theme was implemented in studies on the role of performance objectives in instructional systems design, on the role of self-evaluation and its relationship to performance measurement, on the use of computer models in defining algorithms involving rule-using behavior, and an observation regarding the use of the Pearson product-moment correlation in performance measurement. GRA

N80-14710# Maryland Univ., College Park. Dept. of Psychology.
RATING ERRORS OF INCONSISTENCY AS A FUNCTION OF DIMENSIONALITY OF BEHAVIORAL ANCHORS
Bruce L. Katcher and C. J. Bartlett May 1979 25 p
(Contract N00014-75-C-0884; RR0420402)
(AD-A068922; RR-24) Avail: NTIS HC A02/MF A01

The present study focuses upon rating errors of inconsistency in multidimensional behavior-specific rating scales used for purposes of performance appraisal. The hypothesis that rating scales which are more nearly unidimensional will result in a fewer rating errors of inconsistency was tested using a Mixed Standard Rating Scale developed for police supervisory personnel. Two measures of unidimensionality were used. The correlations between the indices of unidimensionality and rating inconsistency across ten rating dimensions were significant and in the predicted direction, confirming the hypothesis. The implications of the results for behaviorally anchored rating scales are discussed. GRA

N80-14711# Computer Sciences Corp., Huntsville, Ala.
A MIND/BRAIN/MATTER MODEL CONSISTENT WITH QUANTUM PHYSICS AND UFO PHENOMENA
T. E. Bearden 1979 41 p
(AD-A068988) Avail: NTIS HC A03/MF A01 CSCL 05/10

The author introduces a speculative model of mind and matter and their interaction that is consistent with the experimental basis of physics, and which offers mechanisms for paranormal phenomena of all types, including UFO phenomena. Certain conclusions are reached by a new fourth law of logic, which is briefly described and summarized. A new photon interaction model of quantized observable change is also presented. A solution to the problem of the nature of mind is generated, using the author's fourth law of logic, and a seven-dimensional hyperspatial physical model of a living biosystem is developed. Using this basic model, an infinite-dimensional cotemporal hyperspatial model of the physical universe complete with all its life forms is constructed. Levels of unconsciousness-including the collective human species unconscious--emerge naturally as types of crosstalk between hyperframes. By the author's formula, the psychokinetic power of a mind level increases exponentially as the number of biosystem stages involved. At the level of the collective human species unconscious, the psychokinesis is sufficient to materialize symbolic tulpoids (thought forms), given a sufficient stress stimulus in large groups. Using the cold war as the major stress stimulus on mankind since World War II, the author shows that most major UFO waves in the literature precisely fit the model. GRA

N80-14712# Ohio State Univ. Research Foundation, Columbus.
PROCESS MODEL OF HOW THE HUMAN OPERATOR TRACKS DISCONTINUOUS INPUTS Final Report, 1 Jul. 1977 - 30 Sep. 1978
Richard J. Jagacinski, Walter W. Johnson, E. James Hartzell, Sharon Ward, and Kaile Bishop Dec. 1978 32 p refs
(Grant AF-AFOSR-3288-77; AF Proj. 2312)
(AD-A069001; OSURF-760640/784688; AFOSR-79-0607TR)
Avail: NTIS HC A03/MF A01 CSCL 05/10

Two basic research projects were pursued. In conjunction with personnel at the 6570th Aerospace Medical Research Laboratory, Human Operator Effectiveness Branch, experiments determined that the time to acquire stationary targets with position and velocity control systems was a linear function of an Index of Difficulty measure. This measure is a logarithmic function of initial target displacement and target width. The linear relationship with capture time represents an extension of Fitts' Law, known to hold for discrete movements performed with a physical stylus. The slope of the linear relationship between capture time and the Index of Difficulty was considerably steeper for the velocity control system and was slightly steeper for greater initial target uncertainty. The second project investigated the capture of moving targets with three different control systems: (1) two independent position controls, PP; (2) two independent velocity controls, VV;

and (3) one position and one velocity control, PV. The PV system yielded significantly faster capture times than the PP system. However, due to the development of two different control strategies with the VV system the difference between the VV and the other systems was not statistically significant. Further research is recommended to clarify this latter result. GRA

N80-14713# Rochester Univ., N. Y. Center for Visual Science.

A FACILITATION EFFECT IN ORIENTATION DISCRIMINATION

John Lott Brown and Iris M. Kortela 1976 29 p refs
(Contracts N00014-76-C-0189; NEI-ROI-EY-00680)
(AD-A072726; TR-76-2) Avail: NTIS HC A03/MF A01 CSCL 06/16

The minimal stimulus for orientation discrimination consists of two spots of light which define the orientation of an imaginary line. Luminance thresholds for discrimination of orientation were measured with two 5 min test spots, separated by 10, 20, 30 or 40 min of arc, located approximately 2 deg from the fovea. Test flashes were of 2 msec duration and varied in temporal relation from simultaneity to nearly 0.5 sec asynchrony. When measurements were made by an ascending method of limits with both test flashes increasing together, luminance thresholds for orientation discrimination were close to light detection thresholds and were uninfluenced by the temporal relation. When one of the flashes was presented by a constant luminance 0.6 log unit above detection threshold and the luminance of the other was the dependent variable, the luminance threshold for discrimination of orientation of the two spots varied with their temporal and spatial relations. For 30 min separation it was approximately 0.4 log unit below light detection threshold when the variable luminance spot preceded the fixed luminance spot by about 140 msecs for each of two observers. Results with haploscopic presentation suggest that the effect may represent facilitation at the cortex. GRA

N80-14714 Dutch Air Line Pilots Association, Amstelveen.

SLEEP AND BODY RHYTHM DISTURBANCE IN LONG-RANGE AVIATION. THE PROBLEM AND A SEARCH FOR RELIEF

Frank H. Hawkins Sep. 1978 98 p refs
Copyright. Avail: Issuing Activity

The effect of sleep disturbance and deprivation and body rhythm disruption in long-range aviation and on the performance of flight crews was investigated. The theory of sleep and body rhythms is presented and discussed. Human performance and sleep is also discussed. Current relief efforts are described along with possible alternative ways for relief. Some of the alternatives are autogenic training, progressive relaxation, auto-hypnosis, yoga, meditation, and biofeedback. The study concludes that for safety, social, and economic reasons, it would be advisable to research more fully the sleep problem in aviation. R.E.S.

N80-14715*# National Aeronautics and Space Administration, Washington, D. C.

TECHNOLOGIES FOR THE HANDICAPPED AND THE AGED

Trudy E. Bell Jul. 1979 48 p
(NASA-TM-80842) Avail: NTIS HC A03/MF A01 CSCL 05H

Examples of the technology transferred from advanced aerospace research projects to the needs of the handicapped and the elderly are presented. The booket is divided into six sections, concentrating on technology respectively applied to the heart, limbs, senses, diagnostic tools, treatment and overall lifestyle. Within each section, the projects are organized roughly in chronological order, from those already completed and in the marketplace to those on the engineer's drawing board or still a concept in a physician's mind. R.E.S.

N80-14716*# National Aeronautics and Space Administration, Washington, D. C.

SIMULATION OF PHYSIOLOGICAL SYSTEMS IN ORDER TO EVALUATE AND PREDICT THE HUMAN CONDITION IN A SPACE FLIGHT

V. V. Verigo Dec. 1979 26 p refs Transl. into ENGLISH of conf. paper from Inst. of Med. and Biol. Problems, Min. of Health USSR Moscow, 1979 p 1-23 Presented at the 10th Conf. of the Joint Soviet-Am. Working Group on Space Biol. and Med., Houston, Tex., Oct. 1979
(Contract NASw-3198)
(NASA-TM-76016) Avail: NTIS HC A03/MF A01 CSCL 06S

Simulation models were used to study theoretical problems of space biology and medicine. The reaction and adaptation of the main physiological systems to the complex effects of space flight were investigated. Mathematical models were discussed in terms of their significance in the selection of the structure and design of biological life support systems. R.C.T.

N80-14717*# National Aeronautics and Space Administration, Washington, D. C.

BIOLOGICAL SYSTEMS FOR HUMAN LIFE SUPPORT: REVIEW OF THE RESEARCH IN THE USSR

Ye. Ya. Shepelev Dec. 1979 26 p refs Transl. into ENGLISH from Obzor. Issled. v SSSR, Inst. of Med. and Biol. Problems, Ministry of Health (Moscow), 1979 p 1-24 Presented at the 19th Conf. of the Joint Soviet-Am. Working Group on Space Biol. and Med., Houston, Tex., Oct. 1979 Transl. by Scientific Translation Service, Santa Barbara, Calif.
(Contract NASw-3198)
(NASA-TM-76018) Avail: NTIS HC A03/MF A01 CSCL 06K

Various models of biological human life support systems are surveyed. Biological structures, dimensions, and functional parameters of man-chlorella-microorganism models are described. Significant observations and the results obtained from these models are reported. R.C.T.

N80-14718*# Life Systems, Inc., Cleveland, Ohio.

REGENERATIVE CO2 REMOVAL FOR PLSS APPLICATION Final Report

D. B. Heppner, R. R. Woods, and F. H. Schubert Oct. 1979 64 p refs
(Contract NAS9-15218)
(NASA-CR-160419; LSI-TR-319-31-6) Avail: NTIS HC A04/MF A01 CSCL 06K

Various concepts for the design of the nonelectrochemical absorber were defined and evaluated. A preliminary design based on the use of hollow fiber membranes was developed. Small scale bench testing demonstrated the carbon dioxide removal capability and provided design data for scale-up to the one person level. A full scale conceptual design of the absorbent regeneration hardware using six electrochemical cells was also completed. The design was supported by single cell testing and showed that a full scale regeneration system, operating continuously over 24 hours, can regenerate the absorbent from one extravehicular activity mission. The single cell regeneration hardware was operated for over 800 hours. R.E.S.

N80-14719# Systems Technology, Inc., Hawthorne, Calif.

MODELING BIODYNAMIC EFFECTS OF VIBRATION, FIFTH YEAR Final Scientific Report

Henry R. Jex and Raymond E. Magdaleno Aug. 1979 73 p refs
(Contract F44620-73-C-0075; AF Proj. 2312)
(AD-A073819; STI-1037-5; AFOSR-79-0960TR) Avail: NTIS HC A04/MF A01 CSCL 05/5

The biomechanical feedthrough of vertical and/or fore-aft vibration from a seat, to (and through) various parts of the torso, limbs, hands, and head, to a spring-restrained control stick has been modeled over a 5-year effort using prior Air Force and other data bases. This final report summarizes the project results and provides a User's Guide to BIODYN-78, an interactive, remote-access, digital computer program for exercising the model. The model involves 77 postural and physiological parameters to define a broad range of seating/control/display arrangements from supine to erect. An internal routine automatically trims the Torso/Head/Limb system at the desired angles and computes linearized equations of motion, which are solved for their

eigenvalues and resulting transfer functions using highly refined computing routines. In distinction from most past models, this model represents several degrees-of-freedom simultaneously, e.g., vertical and fore/aft shoulder motion, angular head-bobbing, constrained elbow motion, stick-grip-interface force, muscle forces, and stick angular motion, among many others. GRA

N80-14720# Advanced Research Resources Organization, Washington, D.C.

METHODS FOR EVALUATING THE PHYSICAL AND EFFORT REQUIREMENTS OF NAVY TASKS: METABOLIC, PERFORMANCE, AND PHYSICAL ABILITY CORRELATES OF PERCEIVED EFFORT Technical Report, 1 May 1978 - 30 Apr. 1979

Joyce C. Hogan, George D. Ogden, Deborah L. Gebhardt, and Edwin A. Fleishman Apr. 1979 73 p refs
(Contract N00014-78-C-0430)
(AD-A072497; ARRO-3034-R79-3) Avail: NTIS HC A04/MF A01 CSCL 06/16

Two studies examined the reliability and validity of an index of perceived physical effort for assessing the metabolic and ergonomic costs of task performance. In each study, tasks whose actual performance costs were either available from work physiology literature or were calculated mathematically were rated by subjects who had no work cost information on physical effort required in the task. In the first study, subjects (N=50) completed pencil and paper ratings of tasks whose metabolic costs were known using physical ability dimensions and the index of perceived physical effort. Results indicated high correlations between metabolic costs and ratings of physical effort as well as ratings of various strength and stamina factors. In the second study, subjects (N=20) performed 24 diverse manual materials handling tasks whose ergonomic costs were calculated and rated each completed task on the index of physical effort. Results indicated a substantial relationship between actual ft-lbs. of work and ratings of physical effort. Implications of the results are discussed in terms of the inherent psychometric properties of the index and its applied utility for determining criterion performance standards and job-related training. GRA

N80-14721# Anthropology Research Project, Yellow Springs, Ohio.

DESIGN CRITERIA FOR CHARACTERIZING INDIVIDUALS IN THE EXTREME UPPER AND LOWER BODY SIZE RANGES

Kathleen Robinette and Thomas Churchill Wright-Patterson AFB, Ohio AMRL Jun. 1979 92 p refs
(Contract F33615-78-C-0508; AF Proj. 7184)
(AD-A072353; AMRL-TR-79-33) Avail: NTIS HC A05/MF A01 CSCL 06/14

Designers commonly attempt to represent a range of human body sizes by using human manikins, three-dimensional forms, computer simulations, and various other models. These analogues are developed from a limited number of body size groupings, often utilizing 5th, 50th, or 95th percentile values. There are serious limitations to this percentile approach, exemplified by the fact that at the ends of the distribution, percentile values are not additive. Focusing on the ends of the distribution, where limitations are most intense, this report pinpoints and illustrates problems associated with the use of percentile values, and describes two alternative approaches: subgroup and regression values. Either of these altneratives offers significant improvement over the percentile approach and can be used to characterize any portion of the body size distribution. Regression equations for predicting dimensions from weight and stature and from weight and sitting height are provided to aid designers in computing dimensional body size data needed for cockpit and other work station layouts. GRA

N80-14722# Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio.

TIME SIMULATION OF AN AIR SURVEILLANCE TASK WITH VARYING AMOUNTS OF RADAR INFORMATION

William H. Pearson Jun. 1972 28 p refs
(AD-A074866; AMRL-TR-72-74) Avail: NTIS HC A03/MF A01 CSCL 17/7

Subjects observed a computer display unit simulating radar noise and radar trails of 150 and 500 mph aircraft, one per minute on the average, over a 1000 mile square area. Radar information was stored, cycle by cycle, up to a limit of 3,5,7 and 9 twenty second cycles and then presented sequentially rapidly enough to give an illusion of movement in the trails. Subjects detected the presence of aircraft and controlled computer processing by lightpen and keyboard actions. Time-to-detect increased with radar information for 500 mph tracks but not for 150 mph tracks. Probability of detection increased with radar information for 150 mph trails but not for 500 mph trails. These results were interpreted as showing the disruptive effect of (1) simulated radar noise confounded with the amount of radar information because of information storing and (2) the interference of the easier-to-find 500 mph aircraft with the 150 mph aircraft. GRA

N80-14723# Michigan Univ., Ann Arbor. Highway Safety Research Inst.

MOTOR VEHICLE MANUFACTURERS ASSOCIATION (MVMA) TWO-DIMENSIONAL CRASH VICTIM SIMULATION TUTORIAL SYSTEM: SELF-STUDY GUIDE Final Report

Bruce M. Bowman, D. Hurley Robbins, and Robert O. Bennett 28 Jun. 1979 423 p Sponsored in part by Motor Vehicle Manufacturers Assoc.
(PB-299256/8; UMICH-HSRI-79-7-1) Avail: NTIS HC A18/MF A01 CSCL 13F

A mathematical model used for predicting occupant dynamics in a crash environment is described. A self study guide divided into thirteen segments is presented. The data requirements of a set of related model features are included in each segment. Text, illustrations, and example problems are given. R.C.T.

N80-14724# Michigan Univ., Ann Arbor. Highway Safety Research Inst.

MOTOR VEHICLE MANUFACTURERS ASSOCIATION (MVMA) TWO-DIMENSIONAL CRASH VICTIM SIMULATION TUTORIAL SYSTEM: AUDIO-VISUAL PROGRAM Final Report

Bruce M. Bowman, D. Hurley Robbins, and Robert O. Bennett 28 Jun. 1979 303 p Prepared jointly with Motor Vehicle Manuf. Assoc. of the US
(PB-299257/6; UMICH-HSRI-79-7-2) Avail: NTIS HC A14/MF A01 CSCL 13F

A mathematical model used for predicting occupant dynamics in a crash environment is described. An audio visual program divided into thirteen segments is presented. The data requirements of a set of related model features are included in each segment. The narration text and figures used for the 35 mm slides is given. R.C.T.

N80-14725# Michigan Univ., Ann Arbor. Highway Safety Research Inst.

MVMA TWO-DIMENSIONAL CRASH VICTIM SIMULATION, VERSION 4, VOLUME 1 Final Report

Bruce M. Bowman, Robert O. Bennett, and D. Hurley Robbins 29 Jun. 1979 233 p refs Prepared jointly with Motor Vehicle Manuf. Assoc. of the US
(PB-299305/3; UMICH-HSRI-79-5-1-Vol-1) Avail: NTIS HC A11/MF A01; Also available in set of 3 reports HC E13, PB-299304-SET CSCL 13P

The coordinate systems describing occupant position are defined and the formulation of the equations of motion using Lagrangian techniques is detailed. The addition of forces to the equations of motion is described in general, supplemented by specific analyses for vehicle-occupant contact, gravity, joints, and restraint systems. R.C.T.

N80-14726# Michigan Univ., Ann Arbor. Highway Safety Research Inst.

MVMA TWO-DIMENSIONAL CRASH VICTIM SIMULATION, VERSION 4, VOLUME 2 Final Report

Bruce M. Bowman, Robert O. Bennett, and D. Hurley Robbins 29 Jun. 1979 294 p refs Prepared jointly with Motor Vehicle Manuf. Assoc. of the US

(PB-299306/1; UMICH-HSRI-79-5-2-Vol-2) Avail: NTIS HC A13/MF A01; Also available in set of 3 reports HC E13, PB-299304-SET CSCL 13F

The data required to operate the MVMA two dimensional model and program output generated using simple data sets are described. Specifications for the input data cards together with a detailed description of input data quantities are presented. Normal output options and certain normal output quantities are described. Input and output is given for two sample exercises of the computer model. GRA

N80-14727# Michigan Univ., Ann Arbor. Highway Safety Research Inst.

MVMA TWO-DIMENSIONAL CRASH VICTIM SIMULATION, VERSION 4, VOLUME 3 Final Report

Bruce M. Bowman, Robert O. Bennett, D. Hurley Robbins, and Judith M. Becker 29 Jun. 1979 338 p refs Prepared jointly with Motor Vehicle Manuf. Assoc. of the US

(PB-299307/9; UMICH-HSRI-79-5-3-Vol-3) Avail: NTIS HC A15/MF A01; Also available in set of 3 reports HC E13, PB-299304-SET CSCL 13F

The organization of the computer program into live processors and their interactions is presented. Description of program organization and flow, packing techniques, binary output formats, and auxiliary program output is presented for each of the five processors. Design information concerning certain special output subprocessors is provided. Conversion of the computer program for use of various computer systems is discussed. GRA

N80-14728# Advisory Group for Aerospace Research and Development, Paris (France).

MAINTENANCE OF AIR OPERATIONS WHILE UNDER ATTACK WITH CHEMICAL AGENTS

J. Ernsting, ed. (RAF Inst. of Aviation Med., Farnborough, U.K.) Sep. 1979 51 p Presented at the Aerospace Med. Panel's Specialists' Meeting, Brussels, 22-26 Jan. 1979

(AGARD-CP-264-Suppl; ISBN-92-835-0251-5) Avail: NTIS HC A04/MF A01

The capability of NATO Forces to maintain air operations while under attack with chemical agents depends on effective personal and collective protection for the aircrew and ground personnel while allowing them to perform adequately their operational duties. Topics cover the effects and detection of chemical warfare agents as well as protection against them.

N80-14729# Aberdeen Proving Ground, Md. Biomedical Lab.

THE EFFECTS OF ACUTE AND CHRONIC LOW DOSE EXPOSURE TO ANTICHOLINESTERASES

F. C. Cadigan and M. Chipman *In* AGARD Maintenance of Air Operations While Under Attack with Chem. Agents Sep. 1979 3 p refs

Avail: NTIS HC A04/MF A01

Acute sublethal and chronic subclinical exposures to toxic anticholinesterases may result in long term neurobehavioral deficits. The deficits most likely to occur include: slowed reaction times, erratic mood swings, sleep disturbances, and impaired visual memory. Individuals who operate high performance equipment and are acutely exposed should be kept off the job until examinations of brain function are normal. Author

N80-14730# School of Aerospace Medicine, Brooks AFB, Tex.

CONSIDERATION OF PYRIDOSTIGMINE AS A PROPHYLACTIC AGENT FOR AIRCREW

B. Richardson *In* AGARD Maintenance of Air Operations While Under Attack with Chem. Agents Sep. 1979 2 p refs

Avail: NTIS HC A04/MF A01

The carbamate pyridostigmine shows considerable promise as a first-generation prophylatic for nerve agent poisoning. Although it is unlikely to yield all the benefits desirable, the potential utility of pyridostigmine in conjunction with appropriate therapy warrants detailed study. Author

N80-14731# Norwegian Defence Research Establishment, Kjeller. Toxicology Div.

THE EFFECT OF LOCALLY APPLIED ORGANOPHOSPHATES ON MIOSIS AND ACETYLCHOLINESTERASE ADAPTATION TO CHRONIC TREATMENT

Didrik Malthe-Sorenssen, Nils E. Soli, and Frode Fonnum *In* AGARD Maintenance of Air Operations While Under Attack with Chem. Agents Sep. 1979 5 p refs

Avail: NTIS HC A04/MF A01

Topical administration of organophosphates to the eye of guinea pigs inhibited acetylcholinesterase of different parts of the eye to a different degree. The differences reflected most likely dilution of the agent caused by diffusion into the eye. The effect of locally applied organophosphates was ascribed to an effect on the iris and ciliary muscle and not on the retina. The degree of miosis and recovery of pupillary function after soman treatment correlated better to inhibition of external acetylcholinesterase than total acetylcholinesterase. Chronic treatment with soman reduced the miotic potency of soman and reduced the recovery time of the miosis. This adaptation was dependent on other factors than cholinergic. Local treatment of miosis with topical application of oximes to the eye reduced the miosis and reactivated acetylcholinesterase in the cornea and iris. The reactivation was enhanced in the presence of benzalkonium. Author

N80-14732# Federal Armed Forces Medical Coll., Munich (West Germany). Dept. of Toxicology and Pharmacology.

THERAPY ON NERVE AGENT POISONING

Nikolaus P. Weger *In* AGARD Maintenance of Air Operations While Under Attack with Chem. Agents Sep. 1979 4 p refs

Avail: NTIS HC A04/MF A01

The therapeutic properties of various combinations of the bispyridinium salts HS-3 and HS-6 and the cholinolytics atropine and benactyzine against soman poisoning were investigated in unanesthetized male beagles. Present data demonstrate that from all antidotes tested HGG-12-Cl and HGG-42-J in doses effective for treatment of men show good therapeutic effects in beagles poisoned with soman, sarin, and Vx. Best effect has HGG-42-J in a dose of 30 micron Mol/kg(= 18.27 mg/kg). In soman poisoning no reactivation of serum cholinesterase and cholinesterase in erythrocytes was observed. Other mechanisms of therapeutic activity must be explored. A.R.H.

N80-14733# Air Force Systems Command, Wright-Patterson AFB, Ohio. Life Support System Program Office.

APPROACHES TO CW AGENT AREA DETECTION SYSTEMS FOR AIRFIELDS

Francis T. Crimmins and John J. McCambridge *In* AGARD Maintenance of Air Operations While Under Attack with Chem. Agents Sep. 1979 10 p

Avail: NTIS HC A04/MF A01

United States Air Force (USAF) efforts to develop a chemical agent area detection system for the protection of air bases are examined. Point detection techniques which might provide a limited and interim area detection capability are discussed and the A/E23D-3 Chemical Agent Automatic Alarm and its characteristics are described. The USAF requirement for an instrument which will detect toxic chemical agents before they reach the intended target along with the capabilities such a detector must possess are presented. The Air Force's present views on how such a system might operate are explored. A.R.H.

N80-14734# Air Force Systems Command, Wright-Patterson AFB, Ohio. Life Support System Program Office.

PHILOSOPHY OF PROTECTION OF US AIRCREWS AGAINST CHEMICAL WARFARE AGENTS

John J. McCambridge and D. E. Root *In* AGARD Maintenance of Air Operations While Under Attack with Chem. Agents Sep. 1979 2 p

Avail: NTIS HC A04/MF A01

In 1975, the USAF recognized the need to provide protective equipment to aircrews that would allow them to accomplish

their operational missions after having been attacked by an enemy using chemical warfare agents. This requirement was deemed to be an urgent one; thus, a two phase program was initiated. Phase one was the development and production of near term equipment which would provide the required operational capability with delivery of equipment to the field to begin within two years. Phase two consists of a longer term program to provide more complete protection with a reduced operational burden.
Author

N80-14735# Service Technique de l'Aeronautique, Paris (France).
CONCERNING INDIVIDUAL EQUIPMENT FOR FIGHTER PILOTS IN THE AIR FORCE [A PROPOS DES EQUIPEMENTS INDIVIDUELS DES PILOTES DE CHASSE DE L'ARMEE DE L'AIR]
P. H. V. Gaspa *In* AGARD Maintenance of Air Operations While Under Attack with Chem. Agents Sep. 1979 3 p In FRENCH
Avail: NTIS HC A04/MF A01

In addition to the protection provided for all the armed services by way of protective suits, gloves, foot coverings, and masks for filtering particles, aircraft pilots require equipment that must be integrated with the aircraft, with parachutes, with the oxygen supply, and with survival equipment. It must meet the particular specification to provide minimal comfort needed to maintain the potential psychophysiology of the pilots, so they can accomplish their mission (which is always delicate in three dimensional space) in the midst of toxic flight factors and enemy intervention. There must be no thermal nor respiratory constraints. The design of equipment cannot impede pilot movements, the observation of parameters useful for flight, the carrying out of certain commands, nor the tactile agility of the fingers. Transl. by A.R.H.

N80-14736# Air Force Systems Command, Wright-Patterson AFB, Ohio. Life Support System Program Office.
US AIRCREW CHEMICAL DEFENSE ASSEMBLIES
Charles H. Leone and Paul F. Fallon *In* AGARD Maintenance of Air Operations While Under Attack with Chem. Agents Sep. 1979 7 p
Avail: NTIS HC A04/MF A01

The current aircrew chemical defense ensemble which is divided into four subsets: eye/respiratory/head, body, hand and foot protection is described. The associated chemical agent and flight qualification testing is discussed for each piece of equipment. The status of follow on development efforts which concentrate on the aircrew chemical defense eye/respiratory/head protection is reviewed. A.R.H.

N80-14737# Bluecher G.m.b.H. Duesseldorf (West Germany).
FRG AIRCREW CHEMICAL DEFENCE ASSEMBLIES
Hubert vonBluecher *In* AGARD Maintenance of Air Operations While Under Attack with Chem. Agents Sep. 1979 4 p

Avail: NTIS HC A04/MF A01

Topics covered include: (1) nonbattle casualty (NBC)-protection gloves for high performance aircraft pilots; (2) SAr spherical adsorber systems; (3) the NBC-protective suit (or garment) for German propeller-aircraft pilots with emphasis on construction of the materials, life-time, and influence of water and sweat; and (4) flame-proofing for NBC-protective clothing.
A.R.H.

N80-14738# Air Force Systems Command, Wright-Patterson AFB, Ohio. Life Support System Program Office.
INTEGRATION OF PROTECTION AGAINST CHEMICAL WARFARE AGENTS WITH AIRCREW PERSONAL EQUIPMENT
John J. McCambridge and Charles H. Leone *In* AGARD Maintenance of Air Operations While Under Attack with Chem. Agents Sep. 1979 3 p

Avail: NTIS HC A04/MF A01

Protection of the aircrew member through personal equipment is a concept which assumes that such protection can not be provided in any other way. Current efforts to incorporate chemical defensive capabilities into protective equipment for the eyes, respiratory system, body, hands, and feet are described. Integration of chemical agent protection into life support systems on a superior plane would eliminate the need for providing protection through personal equipment - a shirt sleeve environment, so to speak. Such a concept would require protection of the cockpit interior at all times from the introduction of chemical agents and would require the effective filtration of influent air by the environmental control systems. A.R.H.

N80-14739# Advisory Group for Aerospace Research and Development, Paris (France).
SURVEY OF METHODS TO ASSESS WORKLOAD
Bryce O. Hartman, ed. (School of Aerospace Med.) and Richard E. McKenzie, ed. (School of Aerospace Med.) Aug. 1979 160 p refs
(AGARD-AG-246; ISBN-92-835-1332-0) Avail: NTIS HC A08/MF A01

Methods of measuring aircrew workload are reviewed. The methods reviewed include areas of systems design engineering, operations research, the behavioral sciences, aerospace medicine, physiology, biochemistry, and biotechnology in general. The measurement domains include measures of sensory threshold, measures of sensory integration, cognitive function tests, measures of motor function, vigilance, reaction time, psychophysiologic responses, and physiologic and biochemical changes.

N80-14740# Gartner (Walter B.) and Murphy (Miles R.), Menlo Park, Calif.
CONCEPTS OF WORKLOAD
Walter B. Gartner and Miles R. Murphy *In* AGARD Surv. of Methods to Assess Workload Aug. 1979 p 1-2 refs

Avail: NTIS HC A08/MF A01

A summary of the attempts made to quantify the workload imposed on a pilot by a particular aircraft design or operational procedure, or to access the effects of fatigue upon system performance are discussed in regard to the more precise specification of workload and fatigue concepts and to the adequacy of assessment criteria and techniques. The principle unresolved issues in conceptualizing and measuring pilot workload and fatigue are addressed. The conception of workload is divided into three functionally related components: (1) input load, (2) operator effort, and (3) work result. A.W.H.

N80-14741# Gartner (Walter B.) and Murphy (Miles R.), Menlo Park, Calif.
CONCEPTS OF FATIGUE
Walter B. Gartner and Miles R. Murphy *In* AGARD Surv. of Methods to Assess Workload Aug. 1979 p 3-5 refs

Avail: NTIS HC A08/MF A01

A survey of the concepts of pilot fatigue is reviewed. The problem in defining the concept of fatigue and dealing effectively with fatigue is discussed. Factors such as task demands or protracted effort toward fatigue are investigated. Factors such as individual differences in personality, motivation, physical fitness, and life style are considered in the investigation. A.W.H.

N80-14742# School of Aerospace Medicine, Brooks AFB, Tex. Crew Technology Div.
CONCEPTS OF STRESS
Richard E. McKenzie *In* AGARD Surv. of Methods to Assess Workload Aug. 1979 p 7-9 refs

Avail: NTIS HC A08/MF A01

A survey of studies on the concept of stress from flight fatigue is presented. The physiological and psychological factors resulting from stress are examined. Relaxation as an adaptive response to stress is discussed. The use of biofeedback as an adaptive strategy for stress is studied. A.W.H.

N80-14743# Italian Air Force Medical Service H. Q., Rome.
SOME CONSIDERATIONS CONCERNING METHODS TO EVALUATE AND ASSESS WORKLOAD IN AIRCRAFT PILOTS

Gaetano Rotondo *In* AGARD Surv. of Methods to Assess Workload Aug. 1979 p 11-12 refs

Avail: NTIS HC A08/MF A01

Methods for analyzing the various stressing and fatiguing factors that act on the body and psyche of aircrafts' pilots during their specific activity are examined. The variations in the urinary excretion of corticosteroids and especially catecholamine during stress and fatigue are discussed. A.W.H.

N80-14744# School of Aerospace Medicine, Brooks AFB, Tex. Crew Technology Div.

PHYSIOLOGIC ASPECTS OF WORKLOAD/FATIGUE/STRESS

Layne P. Perelli *In* AGARD Surv. of Methods to Assess Workload Aug. 1979 p 13-16 refs

Avail: NTIS HC A08/MF A01

The physiological mechanisms of the aircraft pilot reacting to the effects of workload, the effects of fatigue, or the effects of stress are described. The long term physiological indicators of stress, workload and fatigue recovered from pilots and measured as urinary metabolites are examined. The cardiac activity indicators, heart rate and heart rate variability, are discussed as a tool in evaluating pilot workload. A.W.H.

N80-14745# School of Aerospace Medicine, Brooks AFB, Tex. Crew Technology Div.

SOME INSIGHTS RELATIVE TO THE MAN-MACHINE SYSTEM: AN OVERVIEW OF TEN YEARS OF RESEARCH

Richard E. McKenzie and Bryce O. Hartman *In* AGARD Surv. of Methods to Assess Workload Aug. 1979 p 17-18 refs

Avail: NTIS HC A08/MF A01

The operator skills and the specific tasks involved in current operational aircraft, airborne weapons systems, and space systems are discussed in relation to pilot performance. The effects of fatigue and/or stress upon the pilot operating the systems are reviewed through past research methods. The relationship between information processing ability and aircrew performance is examined. A.W.H.

N80-14746# Virginia Polytechnic Inst. and State Univ., Blacksburg.

AIRCREW WORKLOAD ASSESSMENT TECHNIQUES

Walter W. Wierwille, Robert C. Williges, and Samuel G. Schiflett (NATC, Patuxent River, Md.) *In* AGARD Surv. of Methods to Assess Workload Aug. 1979 p 19-54 refs

Avail: NTIS HC A08/MF A01

A classification scheme is presented which summarizes a survey and analysis of aircrew workload assessment techniques relevant to inflight test and evaluation considerations. Two dimensions consisting of universal operator behaviors and workload assessment methodologies were used in the classification scheme. The universal operator behaviors were classified into categories including perceptual, mediational, communication, and motor processes; whereas the workload assessment methodologies were cataloged under the general categories of subjective opinion, spare mental capacity, primary task, and physiological measures. An applicability matrix based on this classification scheme is presented which summarizes existing research on workload assessment methodologies. Procedures are described whereby this matrix is used as a guide for selecting candidate aircrew workload assessment measures for inflight evaluation. A brief overview of the various workload assessment techniques is presented along with a set of critical criteria that need to be considered in evaluating the feasibility of these measures for inflight environments. A.W.H.

N80-14747# Air Force Systems Command, Wright-Patterson AFB, Ohio. Human Engineering Div.

WORKLOAD ASSESSMENT METHODOLOGY DEVELOPMENT

Billy M. Crawford *In* AGARD Surv. of Methods to Assess Workload Aug. 1979 p 55-67 refs

Avail: NTIS HC A08/MF A01

The development of a method to determine efficient crew compositions, appropriate assignments of duties and responsibilities to crew members, and effective allocations of functions and tasks among men, machines and computers is discussed. The use of the method to identify the critical periods in a task or mission during which the operator's performance is particularly prone to degradation or failure because of work overload stress is examined. Emphasis is placed on man computer interactions and information processing/decision making functions which are not adequately accounted for by conventional human performance metrics, task analysis, time and motion, and time line methods. A.W.H.

N80-14748# School of Aerospace Medicine, Brooks AFB, Tex.

QUANTITATIVE MILITARY WORKLOAD ANALYSIS

Richard A. Albanese *In* AGARD Surv. of Methods to Assess Workload Aug. 1979 p 69-71 refs

Avail: NTIS HC A08/MF A01

A method of tradeoff analysis as applied to workload analysis in the military environment is discussed. It is suggested that workload studies be performed in a tradeoff setting which allows the analyst to estimate the return on investment he has earned through his proposed system modifications. The methodologies described employ mathematical modeling techniques, and it is reinforced that these techniques are an adjunct to, and not a replacement of, more traditional methods of workload analysis. K.L.

N80-14749# Army Aeromedical Research Lab., Fort Rucker, Ala.

VISUAL PERFORMANCE: A METHOD TO ASSESS WORKLOAD IN THE FLIGHT ENVIRONMENT

R. Simmons, M. Sanders, and K. Kimball *In* AGARD Surv. of Methods to Assess Workload Aug. 1979 p 73-81 refs

Avail: NTIS HC A08/MF A01

A method of assessing the workload requirements imposed on the visual system is discussed. The results suggest that the theory is a valuable tool in testing and determining what the visual workload level should be for combat proficient pilots, how long pilots with varying degrees of proficiency should be expected to fly in the combat environment, and aircraft design requirements (such as stability) to reduce the onset of fatigue-induced errors. Additionally, the theory can be utilized to test and determine varying mission related workload, as well as the workload required by special equipment such as the night vision goggles, navigation equipment, and experimental flight displays. K.L.

N80-14750# Royal Aircraft Establishment, Bedford (England).

HANDLING QUALITIES, WORKLOAD AND HEART RATE

Alan H. Roscoe *In* AGARD Surv. of Methods to Assess Workload Aug. 1979 p 83-91 refs

Avail: NTIS HC A08/MF A01

Examples are given of the use of heart rates to augment pilots' opinions of handling and workload during various flight trials. It is shown that this technique gives reasonably good indications of the workload generated by particular handling qualities. Raw data in the form of beat-to-beat heart rate are invaluable for revealing rapid and short duration changes in handling qualities which affect workload. K.L.

N80-14751# Office of Naval Research, Arlington, Va.

BRAIN WAVES AND THE ENHANCEMENT OF PILOT PERFORMANCE

G. H. Lawrence *In* AGARD Surv. of Methods to Assess Workload Aug. 1979 p 93-102 refs

Avail: NTIS HC A08/MF A01

Aspects of brain wave research and brain-behavior relationships that are potentially useful in simulated aircraft crew stations are discussed. A pilot performance research paradigm for studying the use of brain waves is presented. K.L.

N80-14752# California Univ. at Los Angeles. Dept. of Psychology.
PUPILLOMETRIC METHODS OF WORKLOAD EVALUATION: PRESENT STATUS AND FUTURE POSSIBILITIES
Jackson Beatty *In* AGARD Surv. of Methods to Assess Workload Aug. 1979 p 103-109 refs

Avail: NTIS HC A08/MF A01
The use of pupillometric measures in the evaluation of pilot workload is discussed. The innervation of the pupil is described with respect to its connections with brainstem activation systems. Modern methods for pupillometric measurement are described and a series of experiments describing pupillary response in a variety of information processing tasks is reviewed. K.L.

N80-14753# Dunlap and Associates, Inc., La Jolla, Calif.
AIRCREW PERFORMANCE RESEARCH OPPORTUNITIES USING THE AIR COMBAT MANEUVERING RANGE (ACMR)
Clyde A. Brictson and Anthony P. Ciavarelli *In* AGARD Surv. of Methods to Assess Workload Aug. 1979 p 111-113 refs

(Contract N61339-77-C-0167)
Avail: NTIS HC A08/MF A01
Three years of aircrew performance measurement using the Navy's ACMR are presented as evidence of ACMR's research potential. Performance assessment methods used to evaluate pilot proficiency are described. The aircrew assessment methods are used to identify squadron performance differences, evaluate competitive exercises, and provide diagnostic training feedback to operational users. The use of continuously recorded quantitative measures from systems such as ACMR should stimulate more aircrew performance field research ideas. The availability of objective performance criteria promises to be of substantial benefit to both the operational user and the research community in such areas as pilot selection and training, fleet combat readiness, and pilot workload and stress. K.L.

N80-14754# Royal Air Force Inst. of Aviation Medicine, Farnborough (England).
SPEECH PATTERNS AND AIRCREW WORKLOAD
R. Cannings *In* AGARD Surv. of Methods to Assess Workload Aug. 1979 p 115-127 refs

Avail: NTIS HC A08/MF A01
Research into the use of speech patterns for workload analysis is reviewed in terms of a simple speech production model. The applications of analysis techniques are considered. K.L.

N80-14755# National Aviation Facilities Experimental Center, Atlantic City, N. J.
AN EXPLORATORY STUDY OF PSYCHOPHYSIOLOGICAL MEASUREMENTS AS INDICATORS OF AIR TRAFFIC CONTROL SECTOR WORKLOAD
Richard E. McKenzie, Edward P. Buckley, and Kiriako Sarlanis *In* AGARD Surv. of Methods to Assess Workload Aug. 1979 p 129-133 refs
Avail: NTIS HC A08/MF A01
The possibility of relating physiological measures to some aspects of the controller's task (ie. traffic density and the occurrence of aircraft conflicts) was explored. It was found that galvanic skin response changes in the subjects were more detectable using variations in measured amplitude as compared to frequency of galvanic skin response changes. K.L.

N80-14756# National Aviation Facilities Experimental Center, Atlantic City, N. J.
INDIVIDUAL AND SYSTEM PERFORMANCE INDICES FOR THE AIR TRAFFIC CONTROL SYSTEM
Edward P. Buckley, William F. OConnor, and Tom Beebe *In* AGARD Surv. of Methods to Assess Workload Aug. 1979 p 135-136
Avail: NTIS HC A08/MF A01
The relationships between field air traffic controller performance indices and system performance measures were examined. Performance criteria developed within the controller's home facility where he controlled live traffic, and with a specially designed microsystem with simulated traffic were used. K.L.

N80-14757# Civil Aeromedical Inst., Oklahoma City, Okla. Aviation Physiology Lab.
WORKLOAD AND STRESS IN AIR TRAFFIC CONTROLLERS
Carl E. Melton *In* AGARD Surv. of Methods to Assess Workload Aug. 1979 p 137-144 refs

Avail: NTIS HC A08/MF A01
Data collected at 14 air traffic control facilities regarding air traffic controller (ATCS) workload and urinary stress indicator hormone excretion is reviewed. The data show a significant relationship between objective workload measures (radio transmission time and traffic counts) and indexes of catecholamine excretion. Mean epinephrine excretion by ATCS's at six air traffic control towers, ranging from very low to very high traffic density, was significantly ($R = 0.96$) related to annual traffic counts at those towers. The sympatho-adrenomedullary axis that prepares the organism for fight or flight is applicable to ATCS's. The question of underload, optimum load, and overload is discussed. K.L.

N80-14758# School of Aerospace Medicine, Brooks AFB, Tex. Crew Technology Div.
ASSESSMENT CORRELATES OF WORKLOAD AND PERFORMANCE
Richard E. McKenzie *In* AGARD Surv. of Methods to Assess Workload Aug. 1979 p 145-161 refs

Avail: NTIS HC A08/MF A01
Psychological, physiological, stress, and central nervous system correlates of assessment that may help in measuring and assessing human workload and performance are reviewed. Psychophysiological monitoring of central nervous function is discussed. K.L.

N80-15778*# National Aeronautics and Space Administration, Washington, D. C.
INFLUENCE OF HYPOKINESIS ON PHYSIOLOGICAL FUNCTIONS IN FOWL
J. Nvota, D. Lamosova, D. Tesarova, V. Cierna, and P. Vyboh Dec. 1979 14 p refs Transl. into ENGLISH from Vet. Med. (Prague), v. 22, no. 7, 1977 p 425-432 Transl. by Kanner (Leo) Associates, Redwood City, Calif.
(Contract NASw-3199)
(NASA-TM-75999) Avail: NTIS HC A02/MF A01 CSCL 06B
The effects of hypokinesis and postincubation stress (which are characteristic for modern techniques of poultry cage keeping) on the endocrine functions, metabolic reactions, body weight growth and proteosynthesis in the muscle of cocks was investigated. The stress due to hypokinesis was observed in growing cocks housed in metallic cages in which they could hardly turn around. The findings obtained indicate that a 35-day hypokinesis did not exert any more significant influence both on physiological functions and body weight growth as well as on proteosynthesis in the muscle of cocks under study; however, it speeded up the protein metabolism in the muscle. The postincubation stress modified significantly the hypokinesis effect. Findings recorded in birds differed considerably from findings obtained in laboratory mammals, in which the hypokinesis induced significant changes in endocrine functions, body weight decrease and proteosynthesis disorders. A good tolerance of hypokinesis by fowl can be interpreted not only by the phylogenetic remoteness of the compared species but also by the domestication. R.E.S.

N80-15779*# National Aeronautics and Space Administration, Washington, D. C.
THE COURSE OF EXPERIMENTAL STAPHYLOCOCCUS INFECTION IN ALBINO MICE DURING ACTION OF CERTAIN FACTORS OF SPACE FLIGHT
V. Ya. Prokhorov, V. M. Shilov, and E. A. Borman Jan. 1980 8 p refs Transl. into ENGLISH from Zh. Mikrobiol., Epidemiol. i Immunol. (USSR), v. 47, no. 11, 1970 p 82-86 Transl. by Kanner (Leo) Associates, Redwood City, Calif.
(Contract NASw-3199)
(NASA-TM-75973) Avail: NTIS HC A02/MF A01 CSCL 06C

A study was made of the effect of certain factors of space flight, acceleration and hypokinesia, on the course of experimental staphylococcus infection in mice. Combined action of hypokinesia and acceleration caused a marked depression of the phagocytic activity of leukocytes and formation of a considerable amount of alpha toxin. Author

N80-15780*# National Aeronautics and Space Administration, Washington, D. C.
EVOKED POTENTIALS IN IMMOBILIZED CATS TO A COMBINATION OF CLICKS WITH PAINFUL ELECTROCUTANEOUS STIMULI
M. A. Gilinskiy and I. A. Korsakov Nov. 1979 18 p refs Transl. into ENGLISH from Zh. Vyssh. Nerv. Deyatel. (Moscow), v. 23, no. 4, 1973 p 855-863 Transl. by Scientific Translation Service, Box 5456, Santa Barbara, Calif.
(Contract NASw-3198)
(NASA-TM-75941) Avail: NTIS HC A02/MF A01 CSCL 06C

Averaged evoked potentials in the auditory, somatosensory, and motor cortical zones, as well as in the mesencephalic reticular formation were recorded in acute experiments on nonanesthetized, immobilized cats. Omission of the painful stimulus after a number of pairings resulted in the appearance of a delayed evoked potential, often resembling the late phases of the response to the painful stimulus. The characteristics of this response are discussed in comparison with conditioned changes of the sensory potential amplitudes. K.L.

N80-15781*# National Aeronautics and Space Administration, Washington, D. C.
ACTIVITY OF CHOLINESTERASES OF BLOOD AND HEART IN RATS OF DIFFERENT SEX AND AGE DURING MUSCULAR LOADS AND HYPOKINESIA
V. D. Rozanova and G. A. Antonova Dec. 1979 14 p refs Transl. into ENGLISH from Fiziolhk. Zh. SSSR (USSR), v. 64, no. 7, 1978 p 999-1003 Transl. by Scientific Translation Service, Box 5456, Santa Barbara, Calif.
(Contract NASw-3198)
(NASA-TM-75951) Avail: NTIS HC A02/MF A01 CSCL 06C

The activity of acetylcholinesterase (Ache) and butyrilcholinesterase (Bche) in the blood and the heart of 3 and 13 month old control male rats is considerably lower than in female rats. In 25 month old rats, no sex differences in the Ache and Bche were revealed in the heart. In 3 and 13 month old male and female rats, under conditions of muscular exercises, the Ache and Bche activity is lower, and in hypokinetic male rats -- higher than that in respective control animals. In all the rats, irrespective of sex, age, and motor conditions, Ache and Bche activity tended to decrease from the sinoatrial node to the heart apex. Author

N80-15782*# National Aeronautics and Space Administration, Washington, D. C.
RAT REACTION TO HYPOKINESIA AFTER PRIOR ADAPTATION TO HYPOXIA
Z. I. Barashova and O. I. Tarakanova Jan. 1980 13 p refs Transl. into ENGLISH from Fiziolhk. Zh. SSSR (USSR), v. 15, no. 3, 1974 p 434-439 Original language document previously announced as A74-31091 Transl. by Kanner (Leo) Associates, Redwood City, Calif.
(Contract NASw-3199)
(NASA-TM-75964) Avail: NTIS HC A02/MF A01 CSCL 06C

The effect of prior hypoxia adaptation on body tolerance to hypokinesia was investigated. Rats trained to a 50 day period of hypokinesia and hypoxia with a preliminary month of adaptation to hypoxia showed less weight loss, higher indices for red blood content, heightened reactivity of the overall organism and the central nervous system to acute hypoxia, and decreased modification of the skeletal muscles compared to rats subjected to hypokinesia alone. K.L.

N80-15783*# National Aeronautics and Space Administration, Washington, D. C.
STUDY ON THE NEURONAL CIRCUITS IMPLICATED IN POSTURAL TREMOR AND HYPOKINESIA
L. J. Poirier (Canadian Med. Res. Council), G. Bouvier (Canadian Med. Res. Council), P. Bedard (Canadian Med. Res. Council), R. Boucher (Canadian Med. Res. Council), L. Larochelle (Canadian Med. Res. Council), A. Oliver (Canadian Med. Res. Council), and P. Singh (Laval Univ.) Jan. 1980 43 p refs Transl. into ENGLISH from Rev. Neurol. (Paris), v. 120, no. 1, 1969 p 15-40 Transl. by Kanner (Leo) Associates, Redwood City, Calif.
(Contract NASw-3199)
(NASA-TM-76004) Avail: NTIS HC A03/MF A01 CSCL 06C

The effect of various tegmentary lesions at the level of the pontomesenchphalon in monkeys on motor function was observed. The importance of the monoaminergic mechanisms of the brainstem is discussed. The results also show the importance of the descending tegmentary rubral system and the rubroolivocerebellar circuit in controlling peripheral motor activity. The destruction of the sensory motor cortex proves to be a more effective way of eliminating spontaneous or harmaline induced tremor than the complete interruption of the pyramidal system on the level of the cerebral peduncle. Author

N80-15784# Argonne National Lab., Ill.
CHARGE SEPARATION IN SYNTHETIC PHOTO-REACTION CENTERS
J. J. Katz 1978 22 p refs Presented at the Workshop on Light-Induced Charge Separation at Interfaces in Biol. and Chem. Systems, West Berlin, 16 Oct. 1978
(Contract W-31-109-eng-38)
(CONF-781048-1) Avail: NTIS HC A02/MF A01

On the basis of electron paramagnetic resonance studies, there is good reason to suppose that the primary electron donor in plant and bacterial photo-reaction centers is a special pair of chlorophyll molecules. The donor-acceptor coordination interactions characteristics of chlorophyll are used to suggest a structure for the chlorophyll special pair. Chlorophyll special pairs with the suggested structure were prepared in the laboratory. These synthetic reaction centers mimic the essential features of P700 and P865 and provide a useful route to the study of electron transfer from in vivo photo-reaction centers. DOE

N80-15785# Rensselaer Polytechnic Inst., Troy, N. Y.
COMPARISON OF DIURNAL FLUCTUATIONS OF DISSOLVED INORGANIC CARBON AND ALGAL PRODUCTIVITY ESTIMATES IN AN OLIGOTROPHIC AND MESOTROPHIC FRESHWATER ENVIRONMENT
Paul A. Amodeo, Jr. and Nicholas L. Clesceri Jul. 1979 31 p refs
(Contract DI-14-34-0001-7172)
(PB-301201/0; OWRT-B-060-NY(1); W80-00002) Avail: NTIS HC A03/MF A01 CSCL 06C

Factors influencing the daily periodicity of algal carbon incorporation were investigated. Carbon, in the form of dissolved CO_2, is proposed as a major limiting nutrient in both an oligotropic and mesotrophic environment. A relationship between diurnal fluctuations of dissolved inorganic and algal carbon uptake was demonstrated by use of carbon-14 as a radio-carbon tracer. A possible correlation of the above fluctuations with the excretion of organic matter by algae is proposed. Work was conducted at Gull Bay, Lake George, New York and Willsboro Bay, Lake Champlain, New York. GRA

N80-15786# Utah State Univ., Logan. Utah Water Research Lab.

WASTE STABILIZATION LAGOON MICROORGANISM REMOVAL EFFICIENCY AND EFFLUENT DISINFECTION WITH CHLORINE Final Report, Aug. 1975 - Aug. 1976
Bruce A. Johnson, Jeffrey L. Wight, David S. Bowles, James H. Reynolds, and E. Joe Middlebrooks Jul. 1979 386 p refs (Contract EPA-68-03-2151)
(PB-300631/9; EPA-600/2-79-018) Avail: NTIS HC A17/MF A01

The project objectives are to evaluate: (1) the amenability of algae-laden lagoon effluent to chlorine disinfection; and (2) the performance of a multi-cell lagoon system in removing coliform bacteria by natural means without the need for disinfection. Results indicate that adequate disinfection was obtained with combined chlorine residual within a contact period of 60 minutes. Filtered effluent was found to exert less chlorine demand than unfiltered. Temperature, sulfide, and total chemical oxygen demand were the most important factors affecting the chlorine dose necessary to achieve a specified bacteriological quality. A mathematical model was developed for use in selecting the optimal chlorine dosages needed for achieving prescribed levels of disinfection.
GRA

N80-15788*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
THE PHYSIOLOGICAL BASIS FOR SPACECRAFT ENVIRONMENTAL LIMITS
J. M. Waligora, comp. Washington Nov. 1979 229 p refs (NASA-RP-1045; S-487) Avail: NTIS HC A11/MF A01 CSCL 06K

Limits for operational environments are discussed in terms of acceptable physiological changes. The environmental factors considered are pressure, contaminants, temperature, acceleration, noise, rf radiation, and weightlessness.

N80-15789*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
ATMOSPHERE
D. J. Horrigan *In its* The Physiol. Basis for Spacecraft Environ. Limits Nov. 1979 p 1-15 refs

Avail: NTIS HC A11/MF A01 CSCL 06K

The physiological basis of the limits established for atmospheric pressure as well as the partial pressures of oxygen, carbon dioxide, water vapor, and diluent gas are reviewed. K.L.

N80-15790*# Southwest Foundation for Research and Education, San Antonio, Tex.
CONTAMINANTS
H. L. Kaplan *In* NASA. Johnson Space Center The Physiol. Basis for Spacecraft Environ. Limits Nov. 1979 p 17-56 refs

Avail: NTIS HC A11/MF A01 CSCL 06K

Spacecraft contaminants, their sources, and their toxicological effects are summarized. The problems of identifying toxic hazards, establishing standards for their concentrations, and designing removal systems are discussed. K.L.

N80-15791*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
THERMAL ENVIRONMENT
J. M. Waligora *In its* The Physiol. Basis for Spacecraft Environ. Limits Nov. 1979 p 57-69 refs

Avail: NTIS HC A11/MF A01 CSCL 06K

The physiological effects, discomfort, and performance degradation associated with an imbalanced thermal environment are discussed. Temperature tolerance limits are set using thermoregulation models and experimental results. The effects of interacting environmental factors, individual variations, and exposure duration on tolerance limits are considered. K.L.

N80-15792*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
PHYSICAL FORCES GENERATING ACCELERATION, VIBRATION, AND IMPACT
J. M. Waligora *In its* The Physiol. Basis for Spacecraft Environ. Limits Nov. 1979 p 71-107 refs

Avail: NTIS HC A11/MF A01 CSCL 06K

The physiological effects of forces resulting in radial acceleration, sustained linear acceleration, impact, or vibration are identified. Tolerance limits are presented for these forces. K.L.

N80-15793*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
SOUND AND NOISE
J. L. Homick *In its* The Physiol. Basis for Spacecraft Environ. Limits Nov. 1979 p 109-147 refs

Avail: NTIS HC A11/MF A01 CSCL 06K

The effects of audible sound and noise, infrasound, and ultrasound on man are discussed. Those factors which have potential relevance to the space flight situation are emphasized.
K.L.

N80-15794*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
RADIOFREQUENCY RADIATION
D. S. Nachtwey *In its* The Physiol. Basis for Spacecraft Environ. Limits Nov. 1979 p 149-167 refs

Avail: NTIS HC A11/MF A01 CSCL 06R

Sources, biophysical characteristics, and potential biological effects of rf radiation are described. Standards are given for exposure of spacecraft personnel to rf radiation. K.L.

N80-15795*# General Electric Co., Houston, Tex.
WEIGHTLESSNESS
D. J. Grounds *In* NASA. Johnson Space Center The Physiol. Basis for Spacecraft Environ. Limits Nov. 1979 p 169-185 refs
Avail: NTIS HC A11/MF A01 CSCL 06S

The general physiological effects of weightlessness are discussed with emphasis on the physiological effects that could limit mission durations in the absence of effective countermeasures. K.L.

N80-15796*# National Aeronautics and Space Administration, Washington, D. C.
JOINT SOVIET-AMERICAN EXPERIMENT ON HYPOKINESIA: EXPERIMENTAL RESULTS
N. N. Burovskiy Dec. 1979 320 p refs Transl. into ENGLISH of "Sovmestnyy Sovetsko-Amerikanskiy Eksperiment po Giopokinezii. Otchet. Rezul'taty Sovmestnogo Eksperiments", USSR Acad. of Sci. and Ministry of Health, Moscow, Oct. 1979 p 1-372 Transl. by Kanner (Leo) Associates, Redwood City, Calif.
(Contract NASw-3199)
(NASA-TM-76013) Avail: NTIS HC A14/MF A01 CSCL 06S

Comprehensive results are reported from the Soviet portion of a joint Soviet-American experiment involving hypokinesia. The main emphases are on chemical analyses of blood and urine, functional tests, and examination of the cardiovascular system by electrocardiography, echocardiography, and plethysmography.
Author

N80-15797*# National Aeronautics and Space Administration, Washington, D. C.
RESULTS OF MEDICAL STUDIES DURING LONG-TERM MANNED FLIGHTS ON THE ORBITAL SALYUT-6 AND SOYUZ COMPLEX
A. D. Yegorov, comp. Nov. 1979 245 p refs Transl. into ENGLISH of "Rezultaty Meditsinskikh Issledovaniy vo Vremya Dlitel'nykh Pilotiruyemykh Polyetov na Orbital'nom Komplekse 'Salyut-6--Soyuz'", USSR Acad. of Sci., Inst. of Med. and Biol. Problems, Moscow, 1979 Transl. by Kanner (Leo) Associates, Redwood City, Calif.
(Contract NASw-3199)
(NASA-TM-76014) Avail: NTIS HC A11/MF A01 CSCL 06P

Results of tests made on the crews of the Salyut-6 and Soyuz complex are presented. The basic results of studies made

before, during and after 96-day and 140-day flights are presented in 5 sections: characteristics of flight conditions in the orbital complex; the cardiovascular system; the motor sphere and vestibular analyzer; biochemical, hematologic and immunologic studies; and recovery measures in the readaptation period.
Author

N80-15798*# National Aeronautics and Space Administration, Washington, D. C.
CHANGES OF SOME BLOOD INDICES AND MYOCARDIAL ELECTROLYTE CONTENT DURING HYPOKINESIA
B. M. Fedorov, V. P. Krotov, and Ye. N. Zhuravleva Nov. 1979 12 p refs Transl. into ENGLISH from Patol. Fiziol. Eksp. Ter. (USSR), no. 6, Nov. - Dec. 1973 p 27-31 Transl. by Scientific Translation Service, Santa Barbara, Calif.
(Contract NASw-3198)
(NASA-TM-75954) Avail: NTIS HC A02/MF A01 CSCL 06S

Using special hypokinetic cages, the volume changes of circulating blood, its hematocrit and protein content, volume ratios between extra- and intracellular liquids in the body, as well as electrolyte content in the blood and myocardium during hypokinesia were investigated experimentally in rabbits. R.E.S.

N80-15799*# National Aeronautics and Space Administration, Washington, D. C.
MECHANISM OF DISORDER OF PLASTIC PROCESSES IN TISSUE DURING PROLONGED HYPOKINESIA
G. A. Makarov Nov. 1979 11 p refs Transl. into ENGLISH from Patol. Fiziol. Eksp. Ter. (USSR), no. 4, Jul. - Aug. 1974 p 41-45 Transl. by Scientific Translation Service, Box 5456, Santa Barbara, Calif.
(Contract NASw-3198)
(NASA-TM-75955) Avail: NTIS HC A02/MF A01 CSCL 06S

The subcellular structures of the myocardium, skeletal muscles, liver and kidneys of adult rats subjected to hypokinesia (in immobilization chambers) for 15, 30, and 45 days were studied. An anabolyser (retabolil) and vitamin D (a Ca metabolism regulator) were administered to two groups of rats. On the second week of hypokinesia, inhibition of synthesis processes was observed. Administration of retabolil increased protein synthesis both in the normal and hypokinesia-subjected rats; however, in the latter group, synthesis did not completely normalize, especially in the myocardium. Administration of vitamin D also stimulated protein synthesis, apparently by normalizing Ca tissue metabolism. The combined action of both preparations was the most effective in normalizing protein synthesis intensity. It was concluded that inhibition of synthesis is related to weakening of hormone synthesis induction and disorder of Ca metabolism. Author

N80-15800# Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio.
DAYTIME VISUAL ACUITY OF OBSERVERS THROUGH A WINDOW WITH AND WITHOUT BINOCULARS
Herschel C. Self and Steve A. Heckart Jul. 1979 23 p
(AF Proj. 7184)
(AD-A074722; AMRL-TR-79-23) Avail: NTIS HC A02/MF A01 CSCL 05/5

Visual acuity with and without hand-held M-19 7x50 binoculars was tested inside and outside the cab of a Master Surveillance Control Facility (MSCF) Tower. High, medium and low contrast 3 bar resolution test charts were used at a 400 foot distance. Except for low contrast bar patterns, where loss was not large, unaided eye visual acuity was not impaired by cab windows. With binoculars there was a statistically significant, though not large, window-caused loss of visual acuity for all contrasts. Even so, binocular visual acuity for high, medium and low contrast patterns was 5.6, 5.5, and 4.8 times, respectively, better than unaided eye acuity. Recommendations for the MSCF, based on this study, were made. A section of the report examines visual considerations in fence surveillance. GRA

N80-15801# IIT Research Inst., Chicago, Ill.
BIOLOGICAL EFFECTS OF HIGH-VOLTAGE ELECTRIC FIELDS, AN UPDATE. VOLUME 2: BIBLIOGRAPHY Final Report
Jul. 1979 268 p refs Sponsored by Elec. Power Res. Inst. (EPRI Proj. 857-1)
(EPRI-EA-1123-Vol-2) Avail: NTIS HC A12/MF A01

Literature on the biological effects of power frequency electric fields are reviewed. The general findings of this update conclude that it is highly improbable that electric fields from transmission lines have significant biological effects on healthy individuals who encounter such fields in a normal way under ordinary conditions. However, further research is still needed in order to understand the nature and extent of any effects that could be harmful. DOE

N80-15802# California Univ., Berkeley. Lawrence Berkeley Lab.
SPECIAL SESSION ON VISION
F. S. Montalvo May 1979 13 p refs Presented at the ACM/SIGGraph 1979 Conf. on Computer Grahics and Interactive Techniques, Chicago, Aug. 1978
(Contract W-7405-eng-48)
(LBL-9160; CONF-780806-5) Avail: NTIS HC A02/MF A01

Some results of the visual structuring that occurs in the human visual system were demonstrated. It is shown why some features stand out instanteously and others do not. Knowledge of the human input device and its importance in structuring the design of effective computer output devices and displays is discussed. DOE

N80-15803# Gulf South Research Inst., New Orleans, La.
TOXIC POLYPEPTIDES AND UREMIA Final Progress Report, 1 Jun. 1978 - 31 May 1979
K. Ehrlich, E. Klein, F. F. Holland, Jr., and T. Turnham 2 Jul. 1979 47 p refs
(Contract N01-AM-8-2205)
(PB-301063/4; AK-1-8-2205F-79) Avail: NTIS HC A03/MF A01 CSCL 06C

Uremic serum ultrafiltrate was concentrated and fractionated on Bio-Gel P2 and Sephadex G15 columns. Sephadex fractions were tested for toxicity to human cells in culture. Fractions 1 and 2, containing peptide species with molecular weights greater than 700 daltons, inhibited 3H-thymidine uptake by HeLa and skin fibroblast cells more than the low molecular weight Sephadex material and an iso-osmolar control (saline). Fraction 2, containing molecules with molecular weights of angiotensin and vitamin B-12, inhibited 3H-thymidine incorporation the most (at 774 hours, the incorporation rate was only 2 percent of that of the control for one of the uremic ultrafiltrate concentrates). GRA

N80-15804# Bureau of Radiological Health, Rockville, Md. Div. of Electronic Products.
ELECTROMAGNETIC FIELDS IN BIOLOGICAL MEDIA. PART 2: THE SCAT PROGRAM, MULTILAYERED SPHERE, THEORY AND APPLICATIONS Final Report
Stanley M. Neuder Aug. 1979 30 p refs
(PB-300904/0; DHEW/PUB/FDA-79/8072; FDA/BRH-79/114) Avail: NTIS HC A02/MF A01 CSCL 06R

The theory and applications of a computer program, SCAT, for calculating the scattering and power absorption of radiofrequency and microwave radiation by spherical lossy dielectric bodies exposed to linearly polarized plane wave fields are described. The irradiated body may be a homogeneous sphere or multilayered, spherically concentric regions of arbitrary radii. Each region can be made to simulate biological tissue by assigning the appropriate dielectric properties. Induced fields and absorbed power density within these regions may then be calculated for preselected irradiation frequencies. Several applications of the SCAT program are described and associated computer plots are presented and discussed. GRA

N80-15805# Research Triangle Inst., Durham, N. C.
BIOLOGICAL SCREENING OF COMPLEX SAMPLES FROM INDUSTRIAL/ENERGY PROCESSES Progress Report, Sep. 1978 - Jul. 1979
Aug. 1979 24 p refs

(Contract EPA-68-02-2688)
(PB-300459/5; EPA-600/8-79-021) Avail: NTIS HC A02/MF A01 CSCL 06T

A biological screening program for complex samples from industrial and energy processes is described. Program elements and their application to various complex environmental samples are summarized. Results from the application of this program show that it is effective for screening complex mixtures. The data formating procedures used to report results from a diversity of biological tests in a meaningful way are also described. GRA

N80-15806# Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France).
SLEEP, WAKEFULNESS AND CIRCADIAN RHYTHM
Sep. 1979 283 p refs Lectures held in London, 1-2 Oct. 1979, in Paris, 4-5 Oct. 1979, and in Toronto, 9-10 Oct. 1979 (AGARD-LS-105; ISBN-92-835-0249-3) Avail: NTIS HC A13/MF A01

Papers concerning the physiological and psychological aspects of sleep, and the adaptation of man to disturbed sleep are presented. The management of irregular rest and activity is also discussed.

N80-15807# Centre National de la Recherche Scientifique, Paris (France). Lab. de Physiologie.
CIRCADIAN AND CIRCANNUAL RHYTHMS IN HEALTHY ADULTS
Alain Reinberg *In* AGARD Sleep, Wakefulness and Circadian Rhythm Sep. 1979 13 p refs

Avail: NTIS HC A13/MF A01

Physiological processes in any living organism including man are not constant as a function of time: regular and predictable variations with period, tau, of about 24 hours (circadian), about 1 year (circannual) etc. can be detected. Each rhythm can be characterized by estimating such parameters as: acrophase theta (crest time), amplitude A and mesor M (rhythm adjusted mean). The estimation of tau, theta, A and M of a set of variables under specified experimental conditions enable the visualization of an aspect of the temporal organization (or biologic time structure). Aims of chronobiology are to quantify and investigate mechanisms of biological time structures. Biological rhythms and the related temporal organization are genetic in origin. However, one or several rhythm parameters may be influenced by cyclical variations of environmental factors (synchronizers or Zeitgeber). The latter has practical implications since phase shifts of synchronizers may occur with transmeridian flights, night-working and shift-working. Chronobiology also involves the study of rhythmic changes in endoctrine activities (chronoendocrinology) and in drugs effects (chronopharmacology). F.O.S.

N80-15808# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Bonn (West Germany). Inst. fuer Flugmedizin.
CIRCADIAN RHYTHMS OF HUMAN PERFORMANCE AND RESISTANCE: OPERATIONAL ASPECTS
Karl E. Klein and Hans-M. Wegmann *In* AGARD Sleep, Wakefulness and Circadian Rhythm Sep. 1979 17 p refs Also presented at the 4th Ann. Sci. Meeting of the Aerospace Med. Assoc., Bal Harbour, Fla., 13 May 1976

Avail: NTIS HC A13/MF A01

Circadian rhythmicity of mental and physical efficiency, and resistance to noxious hazards are reviewed. The interaction with internal and operational factors and implications are given for the management of human operations. The significance of the biorhythm concept for the prediction of human behavior, and the occurrence of man-related accidents are discussed. F.O.S.

N80-15809# Montefiore Hospital, New York. Dept. of Neurology.
SLEEP STAGE ORGANIZATION: NEURO ENDOCRINE RELATIONS
Elliot D. Weitzman *In* AGARD Sleep, Wakefulness and Circadian Rhythm Sep. 1979 9 p refs

Avail: NTIS HC A13/MF A01

The circadian and shorter term episodic patterns of hormone systems are discussed. These include ACTH-cortisol; growth hormone (GH); prolactin; and the gonadotrophins, luteinizing hormone (LH); and follicle stimulation hormone (FSH). F.O.S.

N80-15810# Naval Health Research Center, San Diego, Calif.
SLEEP DISTURBANCES IN HUMANS
Laverne C. Johnson *In* AGARD Sleep, Wakefulness and Circadian Rhythm Sep. 1979 16 p refs

Avail: NTIS HC A13/MF A01

Disturbed sleep results in feelings of fatigue and, usually, in impaired performance regardless of whether the disturbed sleep is due to excessive noise or a chronic sleep disorder. In addition to noise, some other environmental factors that disturb sleep are temperature, unscheduled operational demands that fragment sleep time, rotating shift-work schedules, and operational requirements that result in air travel across several time zones. While appropriate attention to sleep logistics may minimize the environmental causes of disturbed sleep, resolution of the disturbed sleep of those with sleep disorders is more difficult. The focus in sleep disorders must be on the individual. The major sleep complaint is insomnia, not enough sleep, usually due to prolonged sleep latency. A more serious medical problem, however, may be the complaint of excessive daytime sleep or hypersomnia. Most patients with complaints of hypersomnia are usually diagnosed as having narcolepsy or sleep apnea. Relative to narcolepsy, sleep apnea (episodes of respiratory arrest during sleep) has only recently received attention. In addition to a sleep problem, sleep apneic patients may have hypertension and/or cardiac arrhythmia. F.O.S.

N80-15811# Centre de Recherches du Service de Sante des Armees, Lyons (France).
VIGILANCE AND ATTENTION
M. Defayolle *In* AGARD Sleep, Wakefulness, and Circadian Rhythm Sep. 1979 13 p refs

Avail: NTIS HC A13/MF A01

The relations between vigilance and attention are considered using computer, psychological and physiological techniques. After considering the different types of available measures, the factors influencing attention are reviewed. The characteristics of signals, the environmental conditions, the individual features and the possible interactions between these factors are then studied. The various theories are reviewed and a mathematical model is proposed which integrates activation, the use of processing ability and filtering, taking into consideration the data relative to the environment and to motivation. In conclusion, different methods are proposed from ergonomical, psychological and pharmacological viewpoints. F.O.S.

N80-15812# School of Aerospace Medicine, Brooks AFB, Tex. Crew Technology Div.
BIOCHEMICAL INDICES OF STRESS: BIOCHEMICAL ASPECTS OF THE STRESS RESPONSE
Bryce O. Hartman and James P. Ellis *In* AGARD Sleep, Wakefulness and Circadian Rhythm Sep. 1979 32 p refs

Avail: NTIS HC A13/MF A01

The release of hormones in response to acute flight stresses was investigated in fighter pilots. The biochemical indices discussed include: hormones, hormone precursors, hormone metabolites, nonhormone metabolites, and enzymes of hormone formation/production. Abstracts and operational applications of previously published reports are presented. F.O.S.

N80-15813# Montefiore Hospital, New York. Human Chronophysiology Lab.
BIOLOGICAL RHYTHMS OF MAN LIVING IN ISOLATION FROM TIME CUES
Elliot D. Weitzman, Charles A. Czeisler, and Martin C. MooreEde *In* AGARD Sleep, Wakefulness and Circadian Rhythm Sep. 1979 9 p refs Prepared in cooperation with Harvard Med. School
Avail: NTIS HC A13/MF A01

The results are presented of prolonged measurements of sleep-waking functions in human subjects for periods of 25 to 105 calendar days in an environment free of all time cues. It was found that the biological rhythms of human beings free-run at periods greater than 24 hours, typically at approximately 25 hours. During free-running, the sleep to total time ratio remains constant, approximately .30. F.O.S.

N80-15814# Naval Health Research Center, San Diego, Calif.
SLEEP DISTURBANCE AND PERFORMANCE
Laverne C. Johnson *In* AGARD Sleep, Wakefulness and Circadian Rhythm Sep. 1979 15 p refs

Avail: NTIS HC A13/MF A01

While the type of sleep obtained does not appear to be an important factor in performance, the time of day the sleep is obtained and when the performance occurs are very important. Time-of-day effects are a more crucial factor in performance than the preceding sleep patterns. The effect of total sleep loss becomes pronounced after 48 to 60 hours, consistent performance decrement following reduced sleep or fragmented sleep was not found. Feelings of fatigue, however, are a consistent finding in all sleep-loss studies. A significant relation between sleep quality (good vs. poor sleep) and performance is not easily found. The deleterious effect of hypersomnia, especially that due to narcolepsy is discussed. F.O.S.

N80-15815# Centre National de la Recherche Scientifique, Paris (France). Lab. de Physiologie.
TOLERANCE TO SHIFT WORK: A CHRONOLOGIC APPROACH
Alain Reinberg *In* AGARD Sleep, Wakefulness and Circadian Rhythm Sep. 1979 11 p refs

Avail: NTIS HC A13/MF A01

The hypotheses was tested of possible relationships between the amplitude A of the circadian rhythm of oral temperature on the speed of adjustment during shift work, and tolerance to shift work. Study 1 involved 25 oil refinery operators. A negative correlation ($r = -0.63$; P less than 0.01) was found between the mean A and the acrophase shift delta O resulting from the first night-shift: the larger the A, the smaller the delta O. Study 2 involved 23 steel industry workers and 25 chemical industry workers with either good or poor tolerance to shift work. Tolerance was evaluated conventionally according to 3 types of complaints: digestive troubles, persistant fatigue, sleep alterations. Circadian A of oral temperature is larger in subjects who tolerate to shift work than in intolerant subjects. The study 3 involved 29 oil refinery operators and was designed to retest both hypothesis, their complementarity and to take different age groups into account. Good tolerance to shift work, over many years, appears to be associated with a large circadian amplitude and a slow adjustment during night-shifts (small delta O). F.O.S.

N80-15816# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Bonn (West Germany). Inst. fuer Flugmedizin.
CIRCADIAN RHYTHMS IN AIR OPERATIONS
Karl E. Klein and Hans-M. Wegmann *In* AGARD Sleep, Wakefulness and Circadian Rhythm Sep. 1979 25 p refs

Avail: NTIS HC A13/MF A01

After a brief introduction into the principles of environmental and biological timing systems, the phenomenology of post-transmeridian de- and re-synchronization of circadian rhythms is presented, its control and modification through external and internal factors described, and the consequences for human efficiency and health discussed. There are conclusions drawn as to possible relief measures, formulas and models which define the physiological processes, and predict work loads occurring in transmeridian flight operations. Finally, the incorporation of circadian rhythm aspects into Rest/Duty Regulations is described. Author

N80-15817# Centre de Recherches du Service de Sante des Armees, Lyons (France).
PSYCHOSTIMULANTS
M. Defayolle *In* AGARD Sleep, Wakefulness and Circadian Rhythm Sep. 1979 12 p refs

Avail: NTIS HC A13/MF A01

The state-of-the-art of psychostimulants is reviewed, and a brief historical and geographical survey are presented. The basic neurochemical data on vigilance are considered and the various systems of mediators involved in synaptic conduction are differentiated. The methodology of therapeutic tests on psychotropes is then discussed. The effects induced by the use of the various types of drugs: noo-analeptics, nootropes, thymo-analeptics and metabolic adjuvants are considered. These data are incorporated into a general model of vigilance including the data handling capacity and filtering concepts. The indications and contraindications in the use of psychostimulants are presented. F.O.S.

N80-15818# Royal Air Force Inst. of Aviation Medicine, Farnborough (England).
HYPNOTICS AND THE MANAGEMENT OF DISTURBED SLEEP
A. N. Nicholson, R. G. Borland, and Barbara M. Stone *In* AGARD Sleep, Wakefulness and Circadian Rhythm Sep. 1979 11 p refs

Avail: NTIS HC A13/MF A01

The effects of hypnotics on visuo-motor performance are discussed. The hypnotics studied include barbiturates, benzodiazepines, diazepam and its hyroxylated metabolites, and nordiazem. The effects of hypnotics on sleep are also discussed. F.O.S.

N80-15819# School of Aerospace Medicine, Brooks AFB, Tex. Crew Technology Div.
MANAGEMENT OF IRREGULAR REST AND ACTIVITY
Bryce O. Hartman *In* AGARD Sleep, Wakefulness and Circadian Rhythm Sep. 1979 13 p refs

Avail: NTIS HC A13/MF A01

Biomedical aspects of the irregularity of air operations are discussed in terms of the requirements of aircrews to work without regards for the clock. In practice, operational managers consider the crew limitations and develop workable compromises between these limitations and mission requirements. That variables that must be considered are listed. Data collected from airlift missions are analyzed along with tactical operations. Sleep and the work-rest cycle during missions are discussed. F.O.S.

N80-15820# Los Alamos Scientific Lab., N. Mex.
MENTAL DYNAMICS
F. H. Harlow Jul. 1979 22 p
(Contract W-7405-eng-36)
(LA-7946-MS) Avail: NTIS HC A02/MF A01

The nonphysical life activity within an organism is described mathematically by means of a basic formulation to which numerous variations and embellishments are appended as required. The fundamental principle of overall activity normalization is presented and discussed in terms of its practical and philosophical consequences. Discrimination is introduced as a necessary complement to intelligence and creativity in the structure of genius. Future directions for development are described in terms of both deterministic and stochastic analysis for the organism as an isolated unit, as a member of society, and as an interacting element of the natural universe. DOE

N80-15821*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
SOME HUMAN FACTORS ISSUES IN THE DEVELOPMENT AND EVALUATION OF COCKPIT ALERTING AND WARNING SYSTEMS

Robert J. Randle, Jr., William E. Larsen, and Douglas H. Williams Washington Jan. 1980 65 p refs
(NASA-RP-1055; A-7696) Avail: NTIS HC A04/MF A01 CSCL 05H

A set of general guidelines for evaluating a newly developed cockpit alerting and warning system in terms of human factors issues are provided. Although the discussion centers around a general methodology, it is made specifically to the issues involved in alerting systems. An overall statement of the current operational problem is presented. Human factors problems with reference to existing alerting and warning systems are described. The methodology for proceeding through system development to system test is discussed. The differences between traditional human factors laboratory evaluations and those required for evaluation of complex man-machine systems under development are emphasized. Performance evaluation in the alerting and warning subsystem using a hypothetical sample system is explained. R.C.T.

N80-15822*# National Aeronautics and Space Administration, Washington, D. C.
MODEL TASK FOR THE DYNAMICS OF AN UNDERWATER TWO-LEGGED WALKER
V. V. Beletskiy, V. V. Golubkov, and Ye. A. Stepanova Nov. 1979 49 p refs Transl. into ENGLISH of "Modelnaya Zadacha Dinamiki Podovnoy Dvunogoy Khodby", Rept. Preprint-42 Acad. of Sci. USSR, Inst. of Appl. Math., Moscow, 1979 p 1-58 Transl. by Kanner (Leo) Associates, Redwood City, Calif.
(Contract NASw-3199)
(NASA-TM-75697; Preprint-42) Avail: NTIS HC A03/MF A01 CSCL 05H

A model task of two-legged underwater walking was examined. Characteristics of the walking were established. The underwater walking device is a substantial sphere, which moves on dual-member legs. The dynamics of the device were investigated with the calculation of the buoyancy of Archimedes, and the force of hydrodynamic resistance. R.E.S.

N80-15823# Perceptronics, Inc., Woodland Hills, Calif.
MAN-MACHINE COMMUNICATION IN COMPUTER-AIDED REMOTE MANIPULATION Progress Report, 2 Feb. 1978 - 1 Feb. 1979
William H. Crooks, Efraim Shaket, Yee-Yeen Chu, and Yoram Alperovitch Mar. 1979 167 p refs
(Contract N00014-76-C-0603)
(AD-A074566; PATR-1034-79-3) Avail: NTIS HC A08/MF A01 CSCL 05/8

Automated Remote Manipulation is a prime example of a new type of man-machine interaction in which the human operator must supervise and control a complex and often adaptive man-computer system. Computerized control offers the possibilities of improved performance times and reduced operator workloads with teleoperator systems. Computers can be used at various levels of control, ranging from control augmentation, where the computer performs difficult coordinate transformations which simplify operator control requirements, through complete autonomy in which the computer performs all of the required activities with no intervention by the operator. However, with the introduction of computer-based control techniques, the communication between the operator and the teleoperator becomes an important determinant of work system performance. Rather than controlling directly every action of the manipulator, the operator of a computer-controlled manipulator plans the tasks, commands goal-directed actions, monitors task performance, and intervenes when appropriate. This report describes an analytical and experimental study to investigate the effectiveness of command language structures and the methods for providing feedback information through the use of sensors and displays. GRA

N80-15824# Massachusetts Inst. of Tech., Cambridge. Marine Industry Advisory Services.
TELEOPERATORS UNDER THE SEA
Norman Doelling 1 Jul. 1979 26 p refs
(PB-299883/9; MITSG-79-15; Opportunity-Brief-14; NOAA-79080909; Index-79-715-MOT) Avail: NTIS HC A03/MF A01 CSCL 13J

Research projects being carried out to design, develop, test and extend the capabilities of undersea vehicles are described. The projects relate primarily to untethered, unmanned vehicles, in part because such vehicles offer the greatest challenge and in - part because solution to the difficult problems associated with such systems will have useful applications in tethered and/or manned systems now being developed, built, and used. GRA

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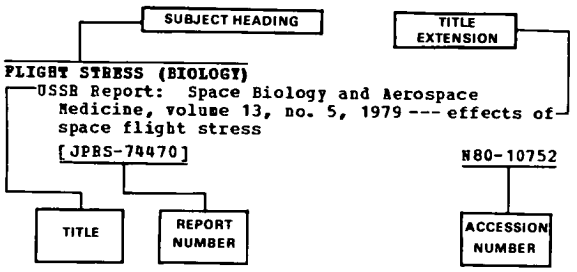

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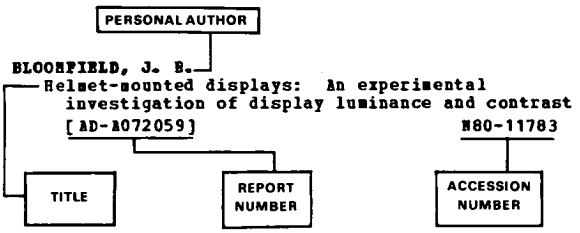

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